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IMPACT ON THE ENVIRONMENT OF SURFACE MINING IN ALBERTA.  
REPORT AND RECOMMENDATIONS. 1972.

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IMPACT  
ON THE ENVIRONMENT  
OF SURFACE MINING  
IN ALBERTA



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**REPORT  
and  
RECOMMENDATIONS**

INST. FOR ENVIRONMENTAL STUDIES  
UNIVERSITY OF TORONTO



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DECEMBER, 1971

JANUARY, 1972

**ENVIRONMENT CONSERVATION  
AUTHORITY**

ALBERTA









# THE IMPACT ON THE ENVIRONMENT OF SURFACE MINING IN ALBERTA

## **REPORT and RECOMMENDATIONS**

**DECEMBER, 1971**

**JANUARY, 1972**

**ENVIRONMENT CONSERVATION AUTHORITY**

9912 - 107th STREET · EDMONTON, ALBERTA · T5K 1G5 ·





## FOREWORD

Soon after its formation the Environment Conservation Authority had been requested by the Government of Alberta to conduct comprehensive and wide-ranging hearings on the impact on the environment of resource development in Alberta. More specifically, the Authority was asked through Public Hearings to review all present legislation and industry practices relevant to the conservation and reclamation of land that is disturbed as a result of coal, oil, gas and forestry development. Attention was also to be paid to the integrity of watershed areas.

The general objective of the Authority was, through the Hearings, to develop advice for the Lieutenant Governor-in-Council on preventive and reclamation procedures that were sufficiently adequate to assure that these resource developments might be conducted in such a fashion that permanent environmental damage would not result therefrom.

In November, 1971, the Honourable Mr. Yurko, Minister of the Environment, directed the Authority to move with particular urgency on those aspects of its Hearings on the impact of the environment of resource development that had to do with surface mining for coal. The Minister had previously expressed concern about the after-effects of mining practices with the announcement that surface reclamation legislation would be rewritten for presentation at the next session of the Legislature, and he wished to have the benefit of the advice that could be developed through Public Hearings to aid him in this task.

The Authority accordingly held Hearings in major population centres in Alberta in December, 1971, and January, 1972. This report presents the recommendations of the Authority as derived from those hearings.

DR. W.R. TROST, Chairman,  
ENVIRONMENT CONSERVATION AUTHORITY.



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## ACKNOWLEDGEMENTS

The contribution that a public hearing can make to the advancement of any subject depends very largely on the submissions, briefs and presentations made to it by members of the public. The Environment Conservation Authority is very much appreciative of the considerable efforts of individuals, groups and associations in preparing their submissions to the hearings, and indeed in acting to bring about the hearings themselves.

The Authority also very much appreciates the wise and thoughtful way in which the submissions were prepared and presented, all the more so since the subject of the hearings is one in which sharply held and conflicting opinions exist. Though the strength of opinion was in no way diluted in presentation through the hearings, the reliance on reason, on logic and on a respectful attention to the views of others emphasized the broad areas of agreement that existed between conflicting parties. It also directed attention and developed further insights into those areas of disagreement that might still have remained among the several sectors of the public after the hearings had closed.

The Authority wishes to thank and commend the participants in the hearings for the reasoned way in which they presented their own views, and the thoughtfulness with which they attended to the views of others.



## LETTER OF TRANSMITTAL

Lieutenant Governor-in-Council,  
Legislative Building,  
Edmonton, Alberta.

Dear Sir:

I have the honour to transmit herewith, the Report and Recommendations of the Environment Conservation Authority on the Public Hearings into the Impact on the Environment of Surface Mining in Alberta, as required by Section 7 (1) (e) of the Environment Conservation Act (Ch.125, R.S.A. 1970).

I have the honour to be, Sir,  
Your obedient servant,

W.R. TROST  
Chairman  
ENVIRONMENT CONSERVATION AUTHORITY



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## **1. PREAMBLE**



## 1.1 RESOURCE DEVELOPMENT AND THE ENVIRONMENT

The conflict between the value of the minerals buried in the earth, and the cost of getting them out has always existed. Indeed the difficulties, and attendant expenses of the mining operations have been a principal factor in determining the price we have had to pay for the use of these minerals.

These factors have applied as much to coal which had a relatively low intrinsic value as fuel, as they did to the heavy metal ores which represented comparatively high value ingredients in industrial manufacturing. As a result, coal mining in particular has historically been subjected to far greater economies than most other mining operations.

As the techniques of strip mining were developed and applied to coal, these economic constraints persisted, and it is not surprising that any non-productive activities such as the restoration of disturbed land surfaces, were kept to a minimum. The scars left by these operations are visible today in most countries where coal mining has been practised.

Present day concerns for the environment however, have produced a change of attitude towards such land disturbances. Not only has the public in general become quick to express its dissatisfaction with unsightly or otherwise undesirable environmental effects, but those engaged in mining themselves are responding by giving attention to some form of reclamation as an inherent part of the mining business.

In Alberta where there is an abundance of energy resources in the form of oil, gas and coal, their development has produced for Albertans a degree of wealth and a quality of life that the residents of other provinces may have been denied. As in other places however, this has not been without its effect on the environment.

In order to ensure future prosperity from the development of natural resources, it is necessary to understand the conflicting implications of resource development.

On the one hand is its potential for benefit to Albertans in the form of gainful employment, revenues from outside, increased accessibility of remote areas and above all, cheap and convenient supplies of energy.

On the other hand there are the inevitable environmental effects which may, in some cases be comparatively slight, of short duration, and easily repairable. In other cases the environmental effects may be more extensive, may extend into secondary results, and may persist over very long periods of time and be extremely difficult and costly to repair or even to identify. This leads to a loss of present and potential future resources and employment. In some extreme cases the result will be permanent loss of some feature of the land or some resource which could never be used again.

## 1.2 SURFACE MINING IN ALBERTA

Although coal has been mined in Alberta since 1835 it is now experiencing unprecedented growth following a severe slump that lasted for twenty years. Rapid expansion of coal extraction by strip-mining has recently occurred in the flat agricultural plains where thermo-electric power generation has been increasing. Surface mining has also occurred in the foothills and mountain regions where extensive deposits of coal suitable for the expanding needs of the international metallurgical industry are known to exist. Future prospects for local energy demands, as well as the expanding industrial uses of coal in Europe and the far East indicate that the output of coal in Alberta will continue to increase. A major portion of this increase is expected to be by means of surface mining techniques.

The Environment Conservation Authority has received briefs and petitions from citizens in many parts of the Province requesting that studies on the environmental effects of such resource developments be undertaken. The themes that emerged at the hearings on the impact of these resource developments included the need for improved environmental management and for a distinction to be made between mining in the uplands and in the plains.

### 1.2.1 Plains vs. Mountains

The problems of mining in the mountains and foothills differs from mining in the prairies in almost every respect. Moreover the coals from the two regions have quite different characteristics, markets and uses. In addition the competitive uses that are disturbed are in each case quite different as are the techniques of mining itself.

In the mountainous regions the coals are anthracitic or bituminous in nature and are suited to the needs of the metallurgical industry. As a result, almost the entire production goes into export markets. They are mined in areas which give rise to the rivers which form the main water supplies to the prairies. The coal seams are bent and tilted and often buried at great depths resulting in the necessity for enormous caverns to expose them.

The areas in which they are mined are often of considerable scenic value and have some potential for recreation.

In the plains the coals are sub-bituminous in nature and well suited as fuel for thermo-electric generation. Large thermo-electric plants are therefore usually located at, or near the mine site and a combined mining and power-generating operation is in many cases, conducted by the power company. In other cases a mining company and power company conduct their separate operations in close association with each other. The power derived from these coals is distributed and sold in Alberta and thus the entire output is consumed by a local market within the province.

The coal seams lie comparatively close to the surface and approximately parallel to it. These factors allow the area strip method to be used and this results in comparatively shallow trench type excavations which can usually be refilled without prolonged delay.

The surface use of the land is generally agricultural and the most likely use after mining would also be agricultural.

### 1.2.2 Environmental Management

Whether mining was to be done in the prairies or in the foothills and mountains a general and consistent emphasis on the need for improved environmental management practices appeared. Indeed representation from the coal companies joined with all other sectors of the public in their emphasis on this point. The level of reclamation that environmental manage-



ment might use as an objective did not readily define itself, but a need for pre-planning as a basis for sound environmental management was clear.

The problems environmental management would have to concern itself with included environmental impacts, competitive land use, pre-planning and site selection and economics. Part of the problem would be how to get from where we are now, to where we want to be.

### 1.3 THE PATH FROM PRESENT PRACTICE TO FUTURE OBJECTIVES

Establishing desirable objectives for sound environmental management is one problem. Dividing practical means to attain these ends is another. In respect of reclamation related to surface mining, ideal objectives are not difficult to state, but knowledge is lacking both as to at least some of the effects of the disturbances on the environment and as to the most desirable or in some cases even the most suitable means to reclaim and restore the disturbance.

The rate at which environmental management can move from present practices to future objectives depends directly on the level of achievement in reclamation research and reclamation technology. This concept developed in a clear way during the hearings. It bridges the gap between what mine operators would do and what others, and they themselves, wanted to do.

Areas in which objectives need to be set and reclamation technology developed by means of research, included the following.

#### 1.3.1 Environmental Impacts

The most frequently expressed concern centered around water quality and quantity. In many cases where adverse effects on a waterway were cited, the involvement of a strip mining operation was fairly obvious. There were however, instances reported to the hearings where serious reductions in the flow rates of major waterways were attributed to strip mining activities in the region of the headwaters. In such cases the causal relationships were not as clearly defined, and a great deal of study will be needed to identify the exact mechanisms involved and prescribe protective measures against possible adverse effects.



Other important environmental impacts that concerned many of the participants were the endangering of wildlife habitats and the lowering of aesthetic values.

In moving towards a more satisfactory balance between strip mining and the environment, it was clearly indicated that the specifics of each of these separate areas of concern will need to be established for each locality before mining commences or before existing activities are expanded.

### 1.3.2 Competitive Land Use

The conflict between recreational potential and the use of land for strip mining was a subject of major concern all through the hearings. Concern was centered mainly on the foothills areas in this case and many participants felt that some of these areas should be completely restricted from surface mining.

There appeared to be little doubt that either enforced or voluntary restraint would be needed to avoid extended disturbances to valuable recreational lands. Here again, the exercise of discrimination, development and the selection of mining techniques and the improvement of restoration procedures were sure to be necessary if acceptable compromises between conflicting land uses are to be achieved in the future.

### 1.3.3 Pre-Planning and Site Selection

Of all the recommendations that were suggested to the Authority at the hearings, those most often repeated concerned the need for pre-planning and careful selection of potential strip mining sites.

The basis for this emphasis was the need that was felt by all participants both within and outside the industry, for a solid framework upon which both mining and subsequent restoration activities could proceed.

There was little doubt that most people wanted to see a sufficiently explicit set of guidelines so that a mining company could assess its chances of satisfactory performance and proceed with confidence or withdraw as it saw fit.

In the future, improvements in technique, both for the extraction of coal from the ground and for the restoration of surface and subsurface disturbances, will progressively allow more and more sensitive sites to

be mined. The application of careful pre-planning and site selection procedures will enable full advantage to be taken of each advancement in technology as it occurs.

#### 1.3.4 Energy Requirements, Economics and Social Benefits

The increasing demands for energy in Alberta as elsewhere will place even greater emphasis on the fullest use of all possible energy resources. In Alberta, the extensive deposits of readily accessible sub-bituminous thermal coal will increasingly be used for this purpose.

In northern climates, such as Alberta's, a high consumption of energy per inhabitant is inevitable and the development and full use of the prairie thermal coal deposits for the benefit of Albertans will continue to increase in importance.

Many briefs referred to the economics of strip mining as compared to such resources as cereal production, timber production, grazing, recreation and the production of potable water. Company briefs in general pointed out the advantages of capital investment in the creation of jobs, and the multiplier effects of new industrial development. In common with those emphasizing the values of resources other than coal, the submissions from coal operators presented little evidence on which detailed economic analyses could be based. Utility companies and the coal companies who supplied them pointed out that the mining of thermal coal, and the production of electricity in coal-powered generating stations, was an industry totally involved with the domestic market, and as such, had special importance for Alberta economically.

Concern was also expressed that values within a community might deteriorate if farmers sold their properties to coal producers and left the area. It was emphasized that farmland should be restored so as to once more produce repeated crops for the foreseeable future. Otherwise the viability of the community itself would be threatened and rural society placed under still greater stress. With an increasing domestic and world need for protein, it was suggested that any activity which might reduce the capacity of the land to produce food should be viewed with strong concern.

### 1.3.5 Legislation and Regulations

The role of government was emphasized throughout, both to enable all mine operators to compete on equal terms and to ensure that desired reclamation objectives would be attained in an organized way.

The three levels at which government operates namely legislation, regulations and enforcement, each require it was felt, clear definition, fairness to all, and flexibility when necessary.

There was substantial support for the principle that legislation dealing with surface mining should apply irrespective of whether the site were located on public or private land. It was emphasized that land should not be destroyed by any activity, and that no avenue should be open for evasion of high reclamation standards by purchase of property which the new owner might not reclaim. A concern was also expressed that the farm community could deteriorate if coal mining companies progressively acquired farm lands for mining purposes, followed by residents leaving the community.

There was a generally expressed concern regarding the role of public hearings in examination of environmental problems. It was felt that decisions concerning resource development and environmental impacts could be made with more awareness of the public benefit and result in better legislation and regulations if all sectors of the public were allowed an opportunity to contribute to them.

The need for strong government controls was clearly expressed and the recommended procedure involved the submission of an environmental impact statement by the coal company before a permit is granted to operate.

### 1.4 CONCENSUS

The general consensus appeared to be that coal mining was of great value to Alberta and was expected to continue but that sound environmental management practices should prevail. In the plains restoration was the likely objective. In the mountains and foothills restoration was less likely and reclamation might require more complicated precautions.

The problems and benefits from coal mining in the foothills and mountains were seen to be different from those obtaining in the plains, and rules and regulations designed for one of these areas would probably not prove relevant when applied to the other.



## 2. INTRODUCTION





## 2.1 THE DECISION TO HOLD A PUBLIC HEARING

In accordance with the provisions of the Environment Conservation Act, the Government of Alberta had requested the Environment Conservation Authority, through Enquiries and Public Hearings, to review all present legislation and industry practices relative to the conservation and reclamation of land that is disturbed as a result of oil, gas, coal and forestry development, with additional attention to be paid to the integrity of watershed areas.

In November 1971, at the request of the Minister of the Environment, the Authority gave first priority to the environmental effects of strip mining and its attendant land reclamation problems.

### 2.1.1 Objectives of the Authority

The objective of the Authority through the hearings was to advise the Lieutenant Governor-in-Council on preventive and reclamation procedures that would be adequate to assure that these resource developments can be conducted in such a fashion that permanent environmental damage does not result.

### 2.1.2 Public Interest

Prior to the Hearings the Authority had been receiving briefs and petitions from many citizens and many parts of the Province, as well as direct representation from the Alberta Fish and Game Association, urging that studies on the environmental effects of surface mining be undertaken by the Authority.

The petitions listed six points that should be included in the study as follows:

- (1) The proposed extent of surface mining in the Province of Alberta;
- (2) The ecological effect of such mining operations;
- (3) The steps necessary to mitigate the effects of such operations;



- (4) The controls and regulations that will be necessary to protect the environment;
- (5) The reclamation procedures necessary and the apportionment of costs;
- (6) The areas where surface mining operations would be allowed.

## 2.2 PRE-HEARING PREPARATIONS

In preparation for the hearings the Authority provided three documents for the public as background information on which briefs could be based. These were a prospectus, principles of proposed legislation and a situation report with respect to coal mining.

### 2.2.1 The Prospectus

Members of the Authority had visited all major surface mining operations in Alberta and others in B.C., Montana, Kentucky and Pennsylvania.

The prospectus was prepared in light of these visits and with the advice of resource personnel of the Alberta Government and private consultants.

The prospectus provides an overview of the history and present status of surface mining operations in the province.

### 2.2.2 Consultant's Report on Surface Mining in Alberta

In order to fully outline all the important beneficial as well as adverse aspects of the project on a factual basis a consultant's report entitled Environmental Impact of Surface Coal Mining Operations in Alberta was commissioned and was presented as a situation report for the public hearings. The Consultant's report contained an outline of the environmental problems associated with provincial surface coal mining operations, including exploration, extraction, processing and transport in the prairies, the foothills and the mountains. It is emphasized that the consultant's report was presented as a situation statement for public discussion, and the Authority did not take the position of necessarily agreeing or disagreeing with any or all of the statements in the report. A summary of this report appears in Appendix 1.

### 2.2.3 Principles of Proposed Legislation

Because it was the intention of the Government to introduce legislation on surface reclamation in the 1972 session, a task force of the Conservation and Utilization Committee had prepared a position paper entitled "Principles Underlying Proposed Surface Reclamation Legislation". This was made available to the Authority by the Minister of the Environment. The Authority in turn provided it to all those who were expected or requested to take part in the hearings. (Appendix 3).

### 2.2.4 Public Announcements

The announcement that hearings were to be held on the Environmental Impact of Surface Mining in Alberta was made at a press conference at Edmonton on November 16, 1971. The Hearings were held at:

Grande Prairie, Alberta  
December 31, 1971

Lethbridge, Alberta  
December 15, 1971

Edmonton, Alberta  
December 17, 1971

Calgary, Alberta  
December 21, 1971

Red Deer, Alberta  
January 6, 1972

In addition to the invitation to the public at large, a number of civic bodies, organizations with broad interests, environmentally concerned groups, industries, interested citizens, and all coal mining companies and electrical utilities were contacted directly and sent an information kit which contained a prospectus on "The Environmental Impact of Surface Mining in Alberta". This paper outlined the present and past state of the coal mining industry, explained some of the environmental concerns, and suggested a number of topics for discussion at the hearings.

The hearings were widely publicized through the co-operation of the press, radio and television stations and by paid advertising in a wide selection of Alberta newspapers. In response a total of one hundred and

six written briefs were received, eighty-five of which were also presented orally at the public hearings. (Appendix 4).

### 2.3 THE HEARINGS

The hearings in each city began with a presentation of the situation report followed by questioning from the Authority. Individuals and representatives of organizations and companies then presented briefs and elaborated on matters within the terms of reference on the hearing. After each presentation the Authority directed questions to the individual concerned in order to clarify certain points or to obtain further information and provision was made at the end of each hearing for a general discussion of the briefs. An analysis of the submissions is presented in Chapter 3 of this report.

### 2.4 SUMMATION AND REPORTING

According to the policy of the Authority, the hearings were documented in four separate ways. In addition, a complete video-tape record was made through the co-operation of the Audio Visual Aids Section of the Department of the Environment.

Records of the hearings are available as follows:

#### 2.4.1 Transcript

A verbatim typewritten transcript of all the oral submissions, questions and answers, and discussions as made from the Authority's tape recordings of the hearings. This transcript is available for inspection at the offices of the Authority.

#### 2.4.2 Proceedings

All written submissions, the three pre-hearing reports and all supplementary briefs and letters as well as a verbatim record of all questions and answers that accompanied the presentation of the briefs are reproduced in a single publication entitled "Proceedings of the Public Hearings on the Impact on the Environment of Surface Mining in Alberta". This

publication consists of 1,060 pages in two volumes and is available on request from the Authority at \$4.00 per set.

#### 2.4.3 Summary

A separate publication entitled "Summary of the Public Hearings on the Impact on the Environment of Surface Mining in Alberta" is available without charge on application to the Authority. The summary consists of 205 pages in one volume, containing a condensation of each submission and of the consultant's report.

#### 2.4.4 Report and Recommendations

The present publication entitled "Report and Recommendations on the Impact on the Environment of Surface Mining in Alberta", is the Authority's official report to the Lieutenant Governor-in-Council. This document is transmitted to the Minister of the Environment for forwarding to the Lieutenant Governor-in-Council. It becomes a public document and can be obtained on application to the Authority after it has been tabled in the Legislative Assembly of Alberta.

### **3. PRESENTATIONS TO THE PUBLIC HEARINGS**





The full weight of argument and of conceptual presentations contained in the submissions to the Public Hearings have been studied in detail by the Authority. The interested reader is referred to the Proceedings and the Summary of the Environmental Impact of Surface Mining in Alberta, which are published separately by the Authority.

In addition an objective analysis of the problems and recommendations developed through the hearings was undertaken to give further clarity and definition to the public view.

### 3.1 ANALYSIS OF SUBMISSIONS

#### 3.1.1 Analytical Technique

To facilitate the development of recommendations based on the results of the public hearings, the contents of the submissions were classified and quantified as one of the steps in determining the nature of the public view on a number of issues involved. Although the briefs varied considerably in their approach and complexity, most of them identified specific problems and made specific recommendations. These two major categories, problems and recommendations were each further subdivided to correspond with the specific points identified in the individual submissions. Using this breakdown, data were tabulated to show the number of briefs which expressed each concern [3.1.5] and which made each recommendation [paragraph 3.1.6]. Also Appendix 2.

#### 3.1.2 Classification of Problems

Many briefs addressed themselves to complex problems and generally expressed concerns that dealt with a wide variety of aspects relating to the subject. For example, many briefs were concerned with the problems of water flow, water pollution and erosion as they were associated with surface mining, and with the distinctions to be made between surface mining in the prairies as compared to the foothills and the mountains. concerns dealing with water quality and quantity are included in a single category in Table 1. Similar comments apply to aesthetics,



alternative land uses and recreation conflicts. In other cases, the concerns were more specific, such as the possible destruction of wildlife habitat, the danger associated with poor road construction and the loss of alpine vegetation. The more specific concerns tended to be stated less frequently. A tabulation is given in Section 3.1.5. Table 1.

### 3.1.3 Classification of Recommendations

The briefs were generally more specific with regard to recommendations. The two most frequently expressed recommendations dealt with restricted areas and the need for research. Many areas were suggested in which surface mining should be restricted, such as alpine zones, watersheds, wilderness and aesthetically pleasing areas. These ecologically sensitive or socially valuable areas requiring special attention, are listed together in Table 2 as restricted zones. In respect of research and planning both general and specific recommendations were made.

In all, thirty separate recommendations were made with twenty-two of these being presented in at least five separate submissions.

In addition to the most often repeated recommendations on restricted zones and the need for research, a large number of submissions recommended comprehensive land use planning; the need for posting security bonds; the need for qualified supervision of reclamation; and the role of Public Hearings as related to the environmental impact of proposed new surface mining operations. A large number of the recommendations which were submitted from many sources concerned regulations and controls, and many of these placed emphasis on the need for planning in various ways.

The tabulation of these is given in Section 3.1.6. Table 2.

### 3.1.4 Statistical

The classification and frequencies presented in the following tables represent a gross tabulation of information on the problems and the recommendations. A more complete and detailed breakdown of the contents of the briefs is given in Appendix 2 at the end of this report.

3.1.5 Table 1

Frequency of Major Problems Expressed at  
Public Hearings on the  
Environmental Impact of Surface Mining in Alberta

| NATURE OF PROBLEM                | NUMBER AND SOURCE OF BRIEFS |             |              |             |         |
|----------------------------------|-----------------------------|-------------|--------------|-------------|---------|
|                                  | INDUSTRIES                  | GOVERNMENTS | ASSOCIATIONS | INDIVIDUALS | TOTAL   |
| Water Quality and Quantity       | 2                           | 11          | 47           | 5           | 65 (9)* |
| Wildlife Habitat                 | -                           | 2           | 14           | 6           | 22 (2)* |
| Aesthetics                       | -                           | 1           | 8            | 6           | 13      |
| Alternate Uses More Economical   | -                           | 2           | 7            | 4           | 13      |
| Conflicts With Recreation        | 1                           | 1           | 9            | -           | 11      |
| Road Construction                | -                           | 1           | 6            | 1           | 8       |
| Destruction of Alpine Vegetation | -                           | -           | 4            | 2           | 6       |

BASED ON A TOTAL OF 106 BRIEFS

Other concerns metioned more than once:

- Wilderness Areas
- Fishing Streams
- Air/Noise Pollution
- Economics of Reclamation
- Wildlife Harassment
- Refuse from Mining Operations
- Royalties Too Low
- Loss of Soil and Timber

\* Number in brackets indicates briefs specifying no concern.

3.1.6 Table 2

Frequency with Which Recommendations Were Proposed

At Public Hearings on the

Environmental Impact of Surface Mining in Alberta

| RECOMMENDATIONS                                   | NUMBER AND SOURCE OF BRIEFS |             |              |             |         |
|---------------------------------------------------|-----------------------------|-------------|--------------|-------------|---------|
|                                                   | INDUSTRIES                  | GOVERNMENTS | ASSOCIATIONS | INDIVIDUALS | TOTAL   |
| Selected Zones be restricted from surface mining  | -                           | -           | 33           | 11          | 44      |
| Comprehensive land use planning                   | 2                           | 5           | 13           | 1           | 21      |
| More research                                     | -                           | 3           | 10           | 5           | 18      |
| Posting of Security Bond                          | 1                           | 1           | 12           | 2           | 16 (1)* |
| Supervision of Reclamation by Qualified Personnel | 1                           | 2           | 5            | -           | 16      |
| Public Hearings on environmental Impacts          | 3                           | 1           | 10           | 1           | 15 (2)* |
| Operator submits plan for Approval                | 2                           | 1           | 10           | 1           | 14      |
| General reclama-tion legislation                  | 11                          | -           | 2            | 1           | 14      |
| Cost-benefit analysis before mining               | -                           | 1           | 10           | 2           | 13      |

Continued.....

|                                                 | INDUSTRIES | GOVERNMENTS | ASSOCIATIONS | INDIVIDUALS | TOTAL   |
|-------------------------------------------------|------------|-------------|--------------|-------------|---------|
| Reclamation keep pace with mining               | 1          | 2           | 8            | 1           | 12 (3)* |
| Specific Reclamation Legislation                | 1          | 2           | 6            | 2           | 11      |
| Reclaim land to previous use                    | -          | 1           | 8            | 1           | 10 (3)* |
| Legislation apply to all surface disturbances   | 3          | 1           | 4            | 1           | 9       |
| Reclamation should be part of mining costs      | -          | 1           | 8            | -           | 9       |
| Centralization of government authority          | 3          | -           | 3            | 2           | 8       |
| Ecological inventory of all proposed mine sites | 1          | -           | 7            | -           | 8       |
| Government and industry plan operations         | 6          | 2           | -            | -           | 8       |
| Retroactive reclamation legislation             | -          | 1           | 6            | 1           | 8 (5)*  |

continued.....

|                                                           | INDUSTRIES | GOVERNMENTS | ASSOCIATIONS | INDIVIDUALS | TOTAL |
|-----------------------------------------------------------|------------|-------------|--------------|-------------|-------|
| Operator must prove he will protect environment           | -          | 2           | 4            | 1           | 7     |
| Data on reclamation must be collected and made available  | 1          | -           | 4            | 1           | 6     |
| Company participate in establishing reclamation standards | 5          | -           | -            | -           | 5     |
| Time Interval between mining and reclamation              | 3          | -           | 1            | 1           | 5     |

BASED ON A TOTAL OF 106 BRIEFS

Other recommendations suggested more than once:

- Legislation should provide for stop-orders.
- Legislation should provide for expropriation.
- Legislation should provide for individual legal action.
- Department of Mines and Minerals should not be authority.
- Planning and enforcement agencies should be separate.
- Company should have right to appeal.
- Violators should be subject to fines and imprisonment.
- No exploration should be permitted in parks.

\* Numbers in brackets indicate briefs specifically not endorsing the recommendations.





## **4. PUBLIC OPINION SURVEY**



#### 4.1 PURPOSE

In order to provide another independent and objective indication of the views of the public at the time of the hearings to compare with those expressed at the hearings themselves, a public opinion poll on a statistical sample of the public was commissioned by the Authority.

#### 4.2 SURVEY METHODOLOGY

A specialist in Public Opinion Surveys was employed to obtain and analyze the opinions expressed by a statistical sample of the Alberta population in respect of key questions which were developed at the hearings. (Appendix 5. Items 7, 8).

##### 4.2.1 Sampling Technique

The sample consisted of 150 people selected on a statistical basis from all regions of the province, and their response to the questions was expressed in percentage terms.

In order to ensure sufficiently broad representation Alberta's 15 census zones were used to represent the rural sector and random samples taken from each.

The two major cities represented the urban population and each was also randomly sampled.

##### 4.2.2 Questionnaires

Amongst the questions asked in the survey were:

- (a) From what you have seen or heard of strip or open-pit mining would you say you are highly concerned, somewhat concerned, or non concerned?
- (b) Do you feel mining sites should be restored so the area is as useful as it was before, restored just enough to look O.K. or not restored at all?

- (c) If Government controls are put into effect should they go as far as the power to cancel leases, have the power to shut down a mine temporarily or get involved only in final approval of the mining site?
- (d) If restoring a mining site meant paying more for your electricity would you be willing to pay reasonable costs, willing to pay part of the costs or not willing to pay?

Further questions were asked to obtain public views on government regulations, the timing they wished to see for restoration activities and the extent to which they wanted public participation in decisions concerning the granting of leases.

#### 4.3 RESPONSES

The responses generally indicated that the majority of the people, apparently more than 80%, showed concern about the environmental effects of surface mining. They wished restoration to be as complete as possible and would endorse strict government controls and regulations to achieve it. They desired public participation in the granting of leases and would be willing to pay at least part of the cost of reclamation through higher prices for electricity.

In the tabulation below the percentage responses from the total sample are given in 3 columns labeled A, B and C. In every case A represents the most positive view, B, a more moderate positive response and C, a negative response or lack of concern.

4.3.1 TABLE 3

|                                                           | % of Total |      |      |
|-----------------------------------------------------------|------------|------|------|
|                                                           | A          | B    | C    |
| 1. Extent of Concern                                      | 27.3       | 64.7 | 8.0  |
| 2. Degree of Restoration Desired                          | 84.7       | 13.3 | 2.0  |
| 3. Speed of Restoration                                   | 71.6       | 23.6 | 4.7  |
| 4. Strength of Government Regulations                     | 74.5       | 24.8 | 0.7  |
| 5. Extent of Government controls                          | 44.6       | 43.2 | 12.2 |
| 6. Degree of Public Participation through Public Hearings | 36.7       | 57.3 | 6.0  |
| 7. Willingness to Pay Costs                               | 20.8       | 58.4 | 20.8 |

## 5. DISCUSSION



## 5.1 PUBLIC AWARENESS

Interest in the environmental impact of surface mining for coal in Alberta has been increasing during the past few years. General concern with environmental quality, publicity and awareness of renewed activities in the coal industry, plus heavy demands for recreational areas in the Province, have all contributed to increased public interest. Announcement that the Authority would hold hearings on the Environmental Impact of Surface Mining in Alberta evoked an immediate public response. Close to 400 people attended the five public hearings, at which eighty-five submissions were made, followed by a further twenty-one supplementary submissions which were received by the Authority after the hearings themselves.

Evidence of the high public interest in surface mining is apparent from the widespread newspaper and television publicity given to surface mining operations, and their subsequent environmental impacts. During the hearings, it was evident that individuals, organizations and coal mining companies had extended considerable effort to place on the public record an impressive body of evidence which the Authority could use in its analysis of the situation. Strong concerns continue to be expressed by a wide variety of interests in surface disturbances of all kinds, but the most obvious, and proportionately the largest interest centres on surface coal mining. In the past, extreme positions have often been taken with regard to surface mining for coal, but it was apparent from the outset of pre-hearing preparation, that in Alberta moderate positions would be in the majority. In addition, the opinions expressed, from the strongest economic arguments to those advocating total preservation were based on reasoned, rather than emotional convictions.



## 5.2 REGIONAL ASPECTS

During the early preparation of material for the Prospectus and consultant's position paper, an emphasis on the regional aspects of coal mining in the Province began to have considerable bearing on the observable environmental impact, as well as on the possibilities for reclamation. Three physiographic regions were recognized, and possible environmental impacts were assessed with respect to each of them. Technical assessments were prepared of the impact of surface mining in the mountains, foothills and plains. It was emphasized that there would be particular problems in the mountains with steep slopes, glaciated valleys, sub-alpine forests and alpine tundra with short growing seasons, severe climate and thin easily disturbed soils. This area is a delicately balanced complex of soil, water and vegetation with very high watershed, wildlife, aesthetic and recreational values, easily susceptible to damage and very slow to heal. Similar, but perhaps less severe problems might be anticipated for the foothills region, which is the transitional area between the plains and mountains, traversed by numerous water courses including several major rivers. Again, values are high for watersheds, fisheries, wildlife, forestry and range and recreational assets. Susceptibility to damage by surface disturbance is high, but rate of healing may be less slow than in the mountains because generally the areas are at a lower altitude. The plains generally have gently rolling topography, with the exception of some of the deeper river valleys. Several ecological types are identified, including prairie grassland, aspen-spruce mixed forest, and mixed coniferous forest. Farming, ranching, forestry and wildlife resources predominate on the plains. Susceptibility to permanent damage appears much lower than in the mountains and foothills.

## 5.3 SCOPE OF THE HEARINGS

The hearings attempted to provide a broad outline of environmental problems which might be associated with surface coal mining operations, including exploration, extraction, processing and transport. Included also

was the necessity to consider the effects of surface coal mining on other natural resources together with an impact appraisal and suggested general approaches to responsibilities for remedial measures and regulatory controls. It should be emphasized that the Situation Statement, principles of Proposed Legislation and Prospectus were presented to the public in order for the public to respond in as knowledgeable a fashion as possible, as well as to raise discussion about the possible issues which might be considered in the environmental impact of surface mining for coal.

#### 5.3.1 Watershed Effects

It became apparent early in the public hearings that a concern had developed for watershed integrity, which was shared to one degree or another by almost all of those making submissions. The public reaction with respect to the integrity of watersheds was to make forceful representations as to the absolute necessity to afford major watersheds fail-safe protection in the course of resource developments. Of particular significance were the submissions made by the Cities of Lethbridge and Red Deer. Each of these submissions was totally unambiguous with respect to the importance of unimpaired water quality. Similar strong representations on the importance of protecting water quality were made from Regional Planning Commissions, Fish and Game Associations and other associations and individuals. Concerns related to water were involved with the need to protect scenic sites such as waterfalls, or sections of rivers which could be considered for "wild river" status. The impact of coal-powered thermal-electric plants on lake and river waters as well as the risk of coal fines escaping from cleaning plants into surface waters, also developed as general public concerns. The subject of chemical effects in water which might result from surface mining was brought out in the hearings with particular attention to possible problems which might arise from alkalinity or the presence of constituents such as metallic ions which might not otherwise appear, except as a direct result of strip mining.

#### 5.3.2 Surface Land Values

A subject which is of direct importance involves the possible decrease in surface land values associated with strip mining activities. Of particular interest to the Province should be the danger of

destruction of good agricultural land in the prairies and possibly of the rural communities that depend upon the agricultural productivity of these lands. There seems to be a consensus in the Province that reclamation of prairie land should not be difficult, and that the land on the prairies should be as useful for agricultural or recreational use after mining as it was before. There is not sufficient evidence to support such a consensus, reasonable as it may appear. Little reclamation of high standard has been accomplished on the prairies as yet, and reclamation research and evaluation of the productivity of reclaimed areas will be required. Also of direct interest to the province should be the possibility of damage to tourist, recreation and aesthetic values and the potentially debilitating effects on wildlife range or animal behaviour in mountain and foothill areas.

#### 5.3.3 Reclamation of Disturbed Lands

From the available evidence, it appears doubtful that permanent environmental damage can be avoided in high mountain areas. A public consensus seems to support the point of view that restoration will be extremely difficult if not impossible in the mountains, and public doubts are also held as to the effectiveness of reclamation in the foothills. Several submissions by mining companies suggested that effective reclamation could be carried out in the foothills and mountains, though restoration of an original condition might not. One such mining company submission, accompanied by photographic evidence indicated that with great care in opening a strip mine, plus strong planning, an acceptable level of reclamation had been achieved in one mountainous area. Doubts were generally expressed by the coal industry that reclamation costs could be kept to a reasonable economic level in areas of steep terrain.

#### 5.3.4 Effects of Exploration and Development Activities

A review of information submitted to the hearings strongly indicates that roads and exploration and other off site developmental activities, can be as damaging or more damaging to the natural landscape than are actual surface coal mining operations. Erosion as well as disturbance to

wildlife caused by exploration activities are of particular importance in foothill and the mountain areas. The use of foothill and mountain areas by surface mining operations are of relatively short duration, while use of the same areas for recreation can continue in perpetuity. Hunting and fishing, cattle grazing, general recreation, production of water and forestry operations are all permanent activities which can be carried out in foothill and mountain areas without detriment to the landscape or permanent loss of resources. There is a real necessity for evaluation of the economic benefits of coal mining including reclamation, in comparison with the various other possible uses of the land so that the net contribution to a stable and continuing economic base for the province can be assured.

#### 5.4 NEED FOR PRE-PLANNING

Pre-planning of the mining operation including an environmental impact statement before exploration or extraction begins, must be considered as the most effective measure towards proper site selection. Planning of the total mining operation including reclamation is the critical step in the prevention of deleterious effects of surface disturbance, for remedial measures if damage does occur, and for reduction of expenditures on labour and capital. Planning at this stage should take into account the mining process, post-mining reclamation, abandonment of mining properties, and the return of the land to productive use under new management. A public consensus exists that in the planning phases all surface mining operations including reclamation should be integrated into one schedule, and that the schedule should be approved by an appropriate regulatory agency before any work is begun.

It is also important to consider that if the site is thought to be particularly difficult to reclaim, pre-planning and establishment of operating rules could allow the mining company a choice as to whether or not to proceed. In mountains and foothills particularly, pre-planning can be important in considering the inherent instability of slopes disturbed by road construction and open pits. If reclamation and re-vegetation is to be successful consideration also must be given to the



fact that top soil is absent or generally sparsely present in mountainous areas. A further important factor is concerned with the advantage of reclamation which may be effected at minimum cost to an operator and for maximum effectiveness of permanent restoration of disturbed areas. Slope instability is of minor concern in open pit coal operations on the plains, but pre-planning including conservation of top soil is an important factor in the economics of reclamation operations in plains.

#### 5.5 RELATIVE BENEFITS OF STRIP MINING IN THE PLAINS

Of considerable concern to the public of Alberta are the present benefits of strip mining in the plains as compared to the yields from such resources as cereal production, timber production, grazing, recreation and production of potable water. Of importance also is the fact that very little evidence is available concerning the comparative economics of these operations from which close approximations of the relative benefits can be made. Advantages can be identified as to capital investment, creation of labour, and the multiplier effects of new industrial development. Utility companies in Alberta which supply electric power to a large proportion of the Province, depend upon prairie coal deposits for their fuel. Recognition must be given to the fact that increased reclamation costs could be reflected by increased costs for electricity to Alberta consumers. These utility companies and coal mining companies supplying them with their fuel are industries which are totally involved with the domestic market within the Province and as such have special importance for Alberta. In some cases, about half of the taxable assessment in some counties can be accounted for in the assessed value of thermal generating stations. If large amounts of land are accumulated by coal mining companies to support their surface mining operations in prairie areas, values within a community could deteriorate if farmers sell their properties to coal producers and leave rural areas. It is important to emphasize that good farmland should produce crops for the foreseeable future. The costs of reclamation, not the value of coal are to be compared to the value of good restored farm land. It is important to emphasize also that with an increasing domestic and world need for protein, any activity

which could reduce the capacity of the land to produce food should be viewed with very strong concerns. The desirable objective is to use the coal resource and to restore the land to its original level of productivity.

## 5.6 LAND TENURE

An important area of public policy is involved with the principle as to whether or not legislation dealing with surface mining should apply equally to public and private lands. It seems clear that the productivity of land lies in the public trust and no accident of ownership whether private or crown should open for evasion of the responsibilities embodied in reclamation legislation. Thus the question of whether or not mining companies should purchase large tracts of land in order to facilitate their mining operations and then retain ownership, is of considerable importance. In this same connection, farm communities could deteriorate if coal mining companies progressively acquired farm lands for mining purposes, and if this action were followed by residents leaving the rural communities. The point at which reclaimed land is once again returned to management by the ultimate user, his involvement in the planning process, and the mechanism by which this is to be achieved will need to be carefully outlined.

## 5.7 MANAGEMENT OF LAND

Post-mining use of disturbed land is related to current and projected use of the surrounding area, if use of reclaimed land is to compliment adjacent land use. A management plan for reclaimed land is as important as the reclamation plan itself. It is important that impact studies consider climate, topography, drainage, soils, vegetation, fish and wildlife, access, human interest areas, settlements and resource use patterns. Management plans will not be effective unless properly supervised by personnel trained and experienced in each phase of the operation, from exploration through extraction, processing, minesite abandonment, land reclamation and eventual return to productive use.



As stated earlier successful reclamation of surface mined sites is as heavily dependent on pre-planning as is any other factor in a successful operation. Actual site preparation for reclamation involves grading, backfilling, soil conservation and replacement, drainage and preparation of an adequate surface seed bed. Revegetation is a primary objective in the shortest time, in order to prevent erosion from wind or water, and to minimize slippage of surface materials. The requirements will vary according to the effects of topography, slope, altitude, precipitation and surface characteristics. In general, establishment of vegetal cover will become progressively more difficult from the plains through the foothills to the mountains, and from south to north. On the plains, proper reclamation appears to be a less difficult problem, and permanent loss of productivity after surface mining operations may perhaps be avoided.

#### 5.8 REGULATIONS AND CONTROLS

Conflicts of resource use may be resolved within the confines of land use policies and defined land management zones, provided that these apply equally to crown and to private lands. Flexibility is required in the review of applications for coal operations, in addition to the use of legislation and regulations, in order to accommodate the wide variety of operating conditions which will undoubtedly occur in the surface coal mining industry. A considerable number of Federal, Provincial and Municipal statutes might apply to coal mining operations, which will require a considerable effort for effective administration of the industry. It is to be expected that management plans, submitted with applications for the operation of the mine will describe the nature, extent and environmental impact of the operation and the measures to be taken which will lessen or remove undesirable environmental impacts. They should also identify the projected use of the land after mining, and measures proposed to achieve that use. It will be important to provide mechanisms for continuing dialogue between coal mining companies and regulatory bodies. Qualified inspectors will be important, in order to supervise all stages of operations, including the monitoring of environmental impact and reclamation procedures conducted by the coal operators.



## 6. RECOMMENDATIONS



The objectives of the Authority in holding public hearings on surface mining have been stated earlier: "to advise the Lieutenant Governor-in-Council on preventive and reclamation procedures that are sufficiently adequate to assure that such resource developments may be conducted in such a fashion that permanent environmental damage does not result therefrom."

Minimizing environmental impacts of surface mining activities and progress towards preventing permanent environmental damage may be accomplished through implementation of recommendations made by the Authority in this report. Two main phases should be recognized. First, prevention or reduction of temporary environmental damage may be largely achieved by comprehensive planning. Second, restoration of a suitable post-mining land use may be accomplished by adequate reclamation procedures.

As stated above, activities which result in permanent loss of productivity of the land are intrinsically undesirable. Reduction or elimination of undesirable environmental impact and restoration of acceptable land use after mining has ceased, should be recognized as a public benefit now and for the future. This concept is fundamental to the terms of reference within which the Authority carried out the public hearings concerning the environmental impact of surface mining. Such a concept is also central to the recommendations contained in this report.

The following recommendations presented by the Environment Conservation Authority, concerning surface mining in Alberta, arise from several sources. First, Authority members and staff have assembled a considerable body of information, by carrying out field trips or from available literature. Second, a consultant was commissioned to carry out an investigation, and has supplied the Authority with a comprehensive situation report. Third, resource personnel from several Alberta Government departments have assisted the Authority by making information freely available. Fourth, a position paper on the principles of reclamation legislation was prepared at the request of the Minister of the Environment by a Task Force of the Conservation

and Utilization Committee and made available by the Minister for publication by the Authority. Finally, with access to the above information the public of Alberta has presented to the Authority its arguments, concepts and recommendations.

The Environment Conservation Authority is of the opinion that its recommendations take account of the best technical information presently available on surface mining in Alberta and elsewhere. The Authority suggests that its recommendations also reflect the weight of public opinion, as indicated by the submissions made to the Authority at the public hearings on the environmental impact of surface mining in Alberta and by statistical sampling of public opinion throughout the Province. From these sources, desirable reclamation objectives can be stated. It is, however, clear that the state of reclamation knowledge is not complete, nor are reclamation technologies well enough known or well enough developed to apply even the present level of reclamation knowledge to surface mining operations in the province immediately. The proposed recommendations describe objectives to be reached. The time required to reach each objective may vary.

## 6.1 ENVIRONMENTAL IMPACTS

### 6.1.1 Surface Reclamation

#### 6.1.1.1 Surface Uses

Restoration of original surfaces and original surface uses may or may not be physically or economically possible as a result of surface reclamation procedures. Alternatives may have to be considered that do not involve the use to which a piece of land was originally subjected.

#### Recommendations on Surface Restoration

- (1) Where surface mining is carried out on productive farmland, restoration of equally productive farmland should be the primary reclamation objective.
- (2) In non-agricultural areas, where the original condition cannot be restored, the primary objective of reclamation should be creation of a new condition of equal or greater value than the original condition.



- (3) Where restoration of the original condition would produce a less valuable result than an alternative new condition, the alternative condition should have priority if the economic balance between the cost of reclamation and the productivity of the reclaimed land is favourable.

#### 6.1.1.2 Reclamation and Final Land use

Involvement of the eventual land user in the procedure leading to reclamation is important, as an essential part of the planning process. In addition, reclamation legislation and regulations, as well as reclamation standards, should apply equally on privately owned land and on Crown land.

#### Recommendations Concerning Final Land Use

- (1) Coal mining operations should be clearly separated from eventual ownership of land, in order to ensure that surface mining does not have the effect of removing resident farmers from the lands as well as destroying community values which are dependent on the resident farm population.
- (2) Where the value of any site will be permanently and substantially less following mining than it was before, this factor should be important in determining whether the mining operation should be allowed on that site.
- (3) The shortest time practicable should elapse between opening a surface mine and reclaiming and revegetating the site prior to abandonment. Normally, this time span should not be permitted to exceed two years.

#### 6.1.1.3 Surface and Sub-surface Materials

Surface reclamation involves not only the exposed surface of the land, but also the clay, gravel, sand or rock strata which lie beneath the surface. In addition, coal may lie in more than one deposit, either on relatively flat seams (in most prairie deposits) or in twisted, bent or fractured geologic strata (common to foothills and mountains). Evidence does not appear to be available as to physical and chemical effects of disturbances on subsurface materials, transposed from a reducing to an oxidizing environment.



#### Recommendations on Surface and Sub-surface Materials

- (1) Studies are recommended concerning the physical and chemical changes which may occur in exposed soils or rocks following disturbance of surface mining.
- (2) Increased research is recommended on the factors affecting horizontal and vertical movement of groundwater and the changes in its ionic constituents, following surface disturbance and reclamation.
- (3) Research is recommended on the factors affecting potential for revegetation of reclaimed land, particularly in relation to (1) and (2) above.

#### 6.1.2 Watershed Integrity

Adequate protection of watersheds and continuation of their ability to deliver a reliable quantity of water of good quality, has obvious importance to any area. In Alberta, almost all communities of significant size rely on streams for their water supply. At the public hearings when presentations were made by major cities, examples were frequently cited of potential or actual impairment by surface mining activities of the quality or quantity of water in the domestic supply to these centres of population.

#### Recommendations on the Protection of Watersheds

- (1) Where surface mining operations are undertaken which involve construction, exploration or surface disturbance, all reasonable precautions should be employed to protect the integrity of watersheds.
- (2) Prohibitions against mining in selected sites should be used to protect waterfalls of great beauty, or to protect sections of streams which might be designated as "wild rivers".
- (3) Standards should be set for construction of roads and for maximum angles of spoil banks to minimize slippage into watercourses. Such standards should apply to active, as well as to reclaimed, abandoned sites.

- (4) As a general rule, exploration roads and trenches, as well as all haulage roads and temporary equipment storage sites should be reclaimed and revegetated immediately they are no longer required, in order to prevent or to minimize surface erosion and siltation of streams.
- (5) All coal handling facilities should be constructed and located in such a fashion to minimize air or water pollution from activities associated with extraction, haulage, washing and cleaning, or storage and loading for shipment. Of particular concern should be coal dust involved with extraction and haulage, and coal fines associated with treatment plant and loading facilities.
- (6) Protective emergency structures with good safety factors should be installed between any coal treatment facility and any watercourse, to prevent pollution of watercourses, particularly by coal fines and wastes during emergency conditions such as sudden, heavy rainstorms or unexpected snow melt, or breakdown of coal washing facilities.
- (7) Particular care should be used in locating coal-powered thermal-electric plants in order to minimize the impacts of discharge of hot water, stack effluents such as gases and fly ash and dissemination of coal dust from pit operation and haulage.
- (8) Investigation should be made as to the possible beneficial uses of cooling water from thermal power plants, as well as the detrimental effects of hot water effluents on lakes or streams.

#### 6.1.3 Conflicts With Other Resource Values

A variety of circumstances may complicate resource extraction such as surface mining. Renewable resources such as water, timber and agriculture may depend totally on the surface for existence, and surface reclamation is already recognized as the device through which surface productivity can be restored. Other cases may exist however, where another non-renewable resource may be exposed when a surface mine is first opened, or during its

operation. Examples include the exposure of deposits of gravel, sand, clay or other valuable materials which may lie in close proximity to coal seams. These resources may be moved, inverted, polluted by coal fines, or otherwise altered, to render them unuseable. In other cases, there may be commodities mixed with coal whose presence was unknown until the coal was extracted, but whose value could be highly significant if recovery of these materials is effected.

The general principle is proposed that where in the course of a resource development, additional resources are revealed, cooperative attempts should be made to outline and define these additional resources. Furthermore, cooperative attempts should be made to achieve maximum benefit from all available resources, rather than the single development of any one at the expense of any of the others.

#### Recommendations Concerning Conflicting Resource Values

- (1) Where any one developer proposes to exploit more than one resource, the proposal for multiple resource development should be assessed for approval on the basis of maximum benefit from these resources.
- (2) Where two or more developers or owners of surface or sub-surface resources are involved separately or jointly in a proposal for development of more than one resource in the same location, a joint plan for the integrated development of the several resources should be submitted for approval.
- (3) Where any resources are identified, but are not to be developed, an assessment should be made of the values of the resources which may be disturbed or destroyed. Where possible, steps should be taken to minimize such losses, to protect the value of the undeveloped resources, or to develop them simultaneously or sequentially.

## 6.2 COMPETITIVE LAND USE

### 6.2.1 Land Use in Upland Areas

Aside from conflicts with other resource values, mentioned earlier

in 6.1.3, a growing conflict seems evident between surface mining on the one hand and tourism and recreation on the other. The foothills and mountains of Alberta are widely recognized and heavily used as prime tourist and recreation areas. Tourism and recreation are generally recognized as labor intensive activities which are not resource consumptive; surface mining is relatively low in labor intensity and consumes the resource on which it is based. The life of a surface mine is relatively short, not generally exceeding 20 years; tourism and recreational activities have a life span related only to the continuing supply of satisfactory recreational experiences.

In Alberta, a large proportion of the tourism and recreation industry is comprised of high density activities, carried out in areas easily accessible by car. Occasionally such activities may benefit from increased access provided by roads built to service mining, but generally tourism and recreation values are lowered by surface disturbances caused by exploration and mining. However, low density activities, based primarily on values associated with solitude, unspoiled wilderness, remote lakes and streams, vistas of rare or unusual beauty and similar attractions, are severely and immediately impaired by industrial exploratory activities or man-made surface disturbances of any kind.

It may be possible for mining operators to create new amenities at the conclusion of mining activities. Lakes may result from pits not completely backfilled; big game range may result from suitable surface restoration. In any case, however, the usefulness of a new condition will be determined by its location with respect to contiguous land use and its ecological suitability in relation to the surrounding area.

The foothills and mountains of Alberta represent a unique asset of great value to the Province. It should be recognized that the long-term value of Alberta foothills and mountains will depend to a considerable degree on the kinds and extent of resource use permitted in the area, and the environmental management practices followed in their development.



General Recommendations for Upland Areas

- (1) Bonding or some other suitable financial guarantee of performance should be required of all coal mine operators or companies, to ensure that under regulations, pre-planned operational and reclamation standards are achieved.
- (2) Before extensive exploration is carried out, a preliminary environmental impact statement should be submitted by the developer, including a proposed exploration plan.
- (3) Before full-scale mining commences at any site, a fully developed reclamation plan should be submitted, which shows in detail, not only the plans for surface restoration and revegetation, but also the areas of temporary spoil storage
- (4) Because restoration of an original condition after mining is improbable in foothills and mountains, reclamation should include consideration of different uses to which sites can be put, which are of equal or greater value than was the original condition.
- (5) It is recommended that in the pre-planning phase the impact of a proposed surface mine operation take into account the effects on tourism and on the recreation potential of the area.
- (6) Where conflicts between surface mining and tourism and recreation are irreconcilable, they should be resolved in favour of the larger and longer-lived social and economic benefits, taking into account the measureable social and economic values for each activity in a community.
- (7) It is recommended that decisions to permit or restrict surface mining on a particular site should be based on comprehensive analyses of social costs and benefits which can be assigned to the individual operation.

### 6.2.2 Land Use in Plains Areas

Community benefit of surface mining in plains areas is substantially different than that in foothills or mountains. Large acreages of potential mine sites in the plains will lie on patented land. Most facilities constructed to handle prairie coal will contribute directly to revenues of counties or municipal districts. Coal mined in the plains presently is used almost exclusively for thermal generation of electricity, with the exception of a few thousand tons per year used directly for heating, or other minor uses. Assessed value of thermal electric generating stations may be responsible for the major revenue of rural municipalities. Electric power generated from the use of sub-bituminous coal is now used entirely in Alberta, but could become a significant export commodity.

A high per capita consumption of energy in Alberta will continue for the foreseeable future and it is certain that the coal resources of the plains will play an important role in utilization of energy resources in total. Development of prairie coal resources will likely proceed for some time using the technique of strip mining. Optimum development of sub-bituminous coal resources for Alberta will require that maximum utilization of coal deposits be linked to minimum surface damage, through the application of the best possible conservation principles, and the prompt adoption of each new improvement in mining and reclamation technology.

Because of apparent ease of reclamation on generally flat prairie lands, and because of their presently productive surface uses, the highest practicable reclamation standards should apply. The amount of recoverable coal lying beneath the surface varies and may be as high as several thousand tons per acre. Surface reclamation costs have not yet been analyzed out of the total cost of planned and integrated strip mining operations, but estimates indicate that reclamation costs may amount to a few cents per ton of coal mined.



Recommendations Concerning Effects of Surface Mining on Land Use  
in the Plains.

- (1) An impact statement should be submitted with an application for operation of a surface mine, which identifies and quantifies the uses and value of the land to be mined. Of particular importance is the necessity to identify and quantify pre-mining agricultural uses and values.
- (2) The impact statement should provide an evaluation of the post-mining use of the area, and should involve the ultimate user in the plan as early as possible.
- (3) The impact statement should include a comprehensive reclamation plan, which should be approved not only by a Provincial regulatory agency, but also by the regional and local authorities and the landowner.
- (4) First priority in reclamation should be assigned to the conservation and replacement of productive topsoil, so that productive agricultural land can be returned to a level of use and productivity which would be no less after mining than before mining commenced.
- (5) If deemed beneficial by the landowner, the community and the regulatory agency, tourist and recreational developments could be incorporated into reclamation plans. Such developments might include golf courses, snowmobile area, fishing ponds, waterfowl marshes or wildlife areas, but only where the land was originally unproductive of significant agricultural values.
- (6) As a summary recommendation, it is strongly suggested that every effort be extended by Provincial, regional and local authorities to protect and maintain the integrity of rural communities, and to resist any tendency toward the permanent withdrawal of productive farmlands from agricultural use and the subsequent departure of farm families from rural communities.

### 6.3 THE IMPORTANCE OF COAL MINING IN ALBERTA

Almost from the first settlement of Alberta, coal has been an energy resource of primary importance. Mining of shallow deposits in the 1800's provided early home heating, and from the beginning of this century had grown in importance in home and institutional heating and as a source of power for trains and ships. Natural gas use over the past three decades has caused a short hiatus in development of coal as an energy source, but gas reserves may not be sufficient to satisfy energy demands to the end of the present century. While coal is no longer of significant use to power trains and ships, its use and potential in thermal electric generation is growing rapidly.

In Alberta, two principal kinds of coal deposits are of value: the extensive sub-bituminous deposits of the prairies and the bituminous deposits of the foothills and mountains. Sub-bituminous coals now are used almost entirely in thermal electric generating plants; the bituminous coal is exported as coking coal to foreign markets. Because of differing physiography of the areas containing coal deposits, as well as completely different markets and economic outlook, surface mining of coal on the prairies poses substantially different economic, social and environmental problems than in the mountains and foothills.

#### 6.3.1 Surface Coal Mining in Plains Areas

The basic ingredients of community benefit from strip mining in the plains are quite different from that in foothills and mountains. The whole circle is turned in prairie mining for sub-bituminous coal, from extraction through final use, while only an arc of the circle appears in foothills or mountain mining for bituminous coal, which is transported out of the Province, and sold on the export market. Moreover, partly because of the climate, there is an indispensable requirement for high energy consumption per inhabitant in the prairie areas that makes it imperative that the low cost, technically accessible sub-bituminous coals of the prairies be retained and utilized for the population of Alberta as time passes.

The generation of thermal electric power from Alberta's prairie coal deposits, supplemented by hydro power, may well provide the major share of Alberta's energy needs now and in the future. If readily accessible power sources are exhausted, it is doubtful if a population can be preferentially maintained in prairie areas. At the same time, surface mining for energy fuels could be hazardous for the agricultural productivity base of the Province, which is also totally undesirable.

It is thus imperative that the coal resources of the prairies be developed, and it is probable that economics will dictate that they be developed by strip mining techniques. It is equally imperative that agricultural productivity be maintained and that surface reclamation procedures be adopted that fully restore, and when possible, enhance the original agricultural productivity of the land which has been disturbed.

Fortunately it seems that the two imperatives can be met through planning, and by the application of the best mining, reclamation and agricultural technologies.

As natural gas and oil reserves are depleted, the habitability of Alberta out of its own energy resources eventually will depend directly on its coal reserves. These can be used to produce coal, gas and electricity to provide power and heat for homes, institutions and various industries. Supplements to coal as an energy fuel may be provided by hydroelectric or even nuclear plants, but coal will steadily increase in importance as the primary energy source in the Province.

Prairie surface mining and development of associated thermal electric plants constitute a priority requirement for Provincial planning. The mechanics of surface mining on the prairies is relatively straightforward and predictable, as is apparently, reclamation of stripped areas. However, important problems such as subsidence of restored surfaces, drainage and alkalinity still remain. It is possible that several hundreds of thousands of acres of prairie land will be stripped in the future. Reclamation objectives of singular clarity are required, and should be outlined through research, defined by legislation and implemented by regulations.

### Recommendations Concerning Prairie Surface Coal Mining

- (1) Early policy planning should be commenced by Government, to ensure that prairie coal mining is included in an integrated land management pattern for all prairie areas under which coal deposits are proven or inferred.
- (2) Bonding or some other suitable financial guarantees of performance should be required of all coal mine operators or companies, to ensure that under regulation, pre-planned operational and reclamation standards are achieved.
- (3) Financial guarantees could be progressively released as reclamation proceeds, but should not be released entirely until five years after first planting of reclaimed land.
- (4) Checks should be made regularly by Government inspectors as to the level of productivity attained and the stability of surface and subsurface materials, both chemically and physically, over the reclamation period.
- (5) A holdback of a portion of a performance deposit, perhaps 10 percent, should be used as insurance of successful revegetation of a reclaimed mine site, and should not be released until an appropriate inspection has revealed a reclamation level in compliance with the regulations.
- (6) Topsoil and remaining overburden should be removed, separately conserved and replaced in a manner which promotes restoration of original surface productivity.
- (7) The size of open pits in prairie mines should be restricted to the minimum necessary for effective operation of the mine.
- (8) As a general operating principle, the time lapse between opening a trench and commencement of surface revegetation should not be more than two years, and where possible, less.
- (9) Surface reclamation regulations should include the provision that equipment necessary for reclamation not normally be removed from a surface mine site until satisfactory topsoil replacement has been effected.



### 6.3.2 Surface Coal Mining in Foothills and Mountains

Evidence was presented at the public hearings, and substantiated by field observations by Authority members, that operation of surface mines in mountainous terrain can pose very great difficulties. Exploration, including road building and trenching, leaves widespread scars, which are difficult to repair. Disposal of overburden from open pits is awkward for mine operators, often because of steep slopes or lack of room for construction of spoil piles. Erosion and siltation commonly may be observed, and evidence of coal fines spread on the landscape or entering streams is relatively common in or near open pits, along haul roads, or adjacent to coal treatment plants. Of all the foothills and mountain surface coal mining sites visited in Alberta and British Columbia, only one had clear evidence of acceptable physical reclamation, but even that site had not yet had time to prove a permanent revegetation.

It is apparent that problems both of surface mining and environmental protection are more complex in foothills and mountains than on the plains. Mining of coking coal in the foothills and mountains is for export, and only a portion of the gross value is returned to Alberta citizens. It may be that waste coal from treatment plants can be of increased importance as fuel for generation of thermal power in the future but at present it constitutes a relatively small proportion of coal used within Alberta.

Coking coal deposits are highly variable in location and are difficult to assess from an engineering point of view. The sale of coking coal is subject to the vagaries of export market changes, and thus mining of coking coal appears to offer higher economic risks than that of thermal coal. Finally, the possibilities for reclamation of sites in foothills and mountains are limited by a variety of factors. Some of the factors which make satisfactory reclamation difficult, or in some cases impossible, are frequency and amount of precipitation, altitude of site, slope of terrain, latitude and annual thermal regime, vegetal cover by amount and type of plant and visual impacts. These factors taken together, make it possible to define a recognizable ecological area or zone of sensitivity in which a site may be located. Location of a site often pre-determines

whether or not reclamation can be done with any assurance of success, following surface disturbance.

An actual surface mine operation may not cause as serious or widespread environmental effects as exploration activities which precede the establishment of the mine. Disturbance of wildlife, destruction of habitat, creation of erosion gullies and siltation of streams are some of the consequences of exploration activities in foothills and mountains.

In summary, the recommendations concerning foothill and mountain surface mining recognize that radically different land management criteria apply to foothills and mountains than those which may be applicable to prairies. Regulations should therefore reflect these wide differences, and recognize that probability of permanent damage is high in foothills and mountains, and that a different condition will almost always result from reclamation following surface disturbance of any kind.

#### Recommendations Concerning Surface Mining in Foothills and Mountains

- (1) As a general recommendation, it is strongly suggested that the comprehensive, pre-development investigations required of the developer by appropriate agencies or departments of government place strong emphasis on site investigation and selection in foothills and mountains.
- (2) Where an application is received to open and operate a surface mine in a foothill or mountain area, it is recommended that a detailed engineering plan be required, signed by a registered professional engineer of Alberta. Pre-mining contours should be shown on the plan, plus details of proposed disposal and storage of spoils during the mining operation, and final slopes and contours of the physically reclaimed site.



- (3) Reclamation standards for foothill and mountain areas should recognize that seldom, if ever, will a mining site located in steep terrain be returned to the state in which it existed before it was mined. For this reason, it is recommended that present uses, as well as alternative post-mining uses of the site, should be identified before any approval is given to explore or to mine the site. Furthermore, the extent to which post-mining use of the area can be shown to be of inferior value to pre-mining use should be one of the factors in determining whether surface mining should be permitted or not.
- (4) Because the results of mining activities in foothills and mountains can have detrimental effects on watersheds for considerable distances downstream, the extent of this risk should be assessed for each site and be one of the factors in determining whether surface mining should be permitted or not on that site.

#### 6.4 INTEGRATED PLANNING AND SITE SELECTION

##### 6.4.1 Present Operations

With respect to surface mines already in operation, it is not possible to develop a coal deposit with comprehensive, integrated planning from first exploration to final reclamation and release of the site to post-mining use. However, it appeared from submissions at the hearings that a public consensus exists, and the coal industry agreed, that an attempt should be made to phase in planning of ongoing operations to new regulations, wherever possible. Consideration must be made for the fact that ongoing operations were planned and mining is presently being carried out under older regulations which may be fully met by the mining company, but which may not fit new legislation, regulations or enforcement standards.

#### 6.4.1.1 Site Selection

A site may have been selected and approved earlier, which may now, under new legislation, be undesirable. A legislative device which appears feasible, under which such an operation could be given review, suspended if necessary, or become the subject of a public hearing, is the stop order procedure under the Department of the Environment Act. Aside from existing or new legislation, time limits could be agreed to, beyond which surface mine operations could not extend without approved operational and reclamation plans.

It is important to emphasize that existing mining operations are carried out by companies within a legal framework, which has also received policy approval from a variety of Government departments or agencies. Any alteration in their operations by new directives should be carefully thought out, but obviously new regulations ultimately must be enforced.

#### Recommendations Concerning Approval or Rejection of Sites

- (1) A regulatory device under new legislation should be provided, to enable the smooth transition of existing surface mining operations into compliance with new regulations.
- (2) Use of new legislation to regulate, alter or suspend a present surface mining operation should provide sufficient notice to the operator and have due regard for the fact that the operation had been legally correct under old legislation.

#### 6.4.2 Future Operations

A general agreement appeared in submissions to the public hearings that integrated planning of the total mining operation should occur, including exploration, drilling, mining, hauling, processing and reclamation. Industry officials stressed the need for government approval of the total operation, in order that all mining companies be treated alike. The need for restricted areas where mining would not be allowed was the most frequently expressed recommendation in submissions from the public. (Appendix 2).

#### 6.4.3 Site Investigation and Classification

Of particular importance are mountain or foothills sites with coal deposits which bear a significant locational relationship to parks, wilderness areas, outstanding geographical features, key drainage basins and critical wildlife habitat, particularly wintering areas, as well as areas of great beauty or of archaeological or historical importance. Similar importance can be attached to sites on the prairies, but it is likely that in these areas, agricultural values will be of higher priority. Sites which occur in areas of great sensitivity clearly will be those concerning which early decisions should be made as to whether or not they should be reserved entirely against exploration and mining activities. It should be recognized as a matter of principle that a site within any area of productive farmland on the prairies, or a site at an altitude of 5000 feet or higher in foothills or mountains, be given intensive scrutiny for environmental impact.

#### Recommendations Concerning Site Selection

- (1) Investigations toward the identification of sites that require protection should be ongoing activities in Government departments.
- (2) Site sensitivity might be judged initially on an area basis, and finalized by field inspections, to identify and classify highly sensitive local areas.
- (3) If sites cannot be developed in areas of great sensitivity without permanent impairment of their values, then these areas should be entirely reserved against exploration and mining activities.

#### 6.5 RECLAMATION RESEARCH AND TECHNOLOGY

Surface mining methods result in the efficient extraction of sub-surface non-renewable resources. However, the long-range effects of severe surface disturbances may still be partly unpredictable, even when apparently satisfactory surface reclamation procedures are followed.

Strip mining in good farmland can, with good reclamation procedures, restore a surface that contains much of the original topsoil. The materials below the restored surface will however, have been inverted, moved and mixed in many ways. Clays which had been deeply buried may now be near the surface, and clays and gravels may be intermingled. In addition, the coal deposits have been removed beneath the new surface, whereas in adjoining areas, the original coal deposits still exist.

There is apparently no knowledge at present which describes how surface disturbances might affect the movement of waters through the restored land, both vertically and horizontally into, or from adjoining undisturbed areas. Apparently also, there is no knowledge to indicate how the chemical content of these waters might have changed, either through the solution of divalent metallic ions from the newly exposed clays, or because of the absorption of metallic ions from the waters by these same previously deeply buried materials. The absorptive and desorptive powers of these clays are known, but the net effect on the percolating waters is not. Of direct and serious concern is the lack of knowledge concerning the effect on productivity of the newly restored surface, even if that surface consists of topsoil which has been carefully segregated and replaced.

A variety of problems exists which relate to reclamation in the several regions, and which require research to establish and elucidate relevant and important facts. Examples of some of these problems are surface subsidence, species selection and adaptation, and soil rehabilitation. In addition, even where research has provided information which scientists require, the question of application of this knowledge remains. It is clear that the employees of mining companies, as well as the eventual users of the reclaimed land will need to have available to them the knowledge and know-how that reclamation procedures will demand. Government inspectors who will have final responsibility for assessing effectiveness of reclamation procedures will also require qualifications, training and access to reclamation information.



Recommendations Concerning Reclamation Research and Technology

- (1) Reclamation research projects should be undertaken jointly by the Federal and Provincial Governments and by industry in cooperation with the universities to establish the basic information that is needed to guide reclamation practices.
- (2) A reclamation manual should be prepared and published that describes the best procedures known as to reclamation of strip mining sites on the prairies as well as reclamation of surface mining sites in the foothills and mountains. The reclamation manual should be updated annually or at regular intervals, as technology improves and as research reveals new information.
- (3) Training programs in reclamation technology should be initiated at technological institutes or vocational schools, so that training can be given to individuals, including heavy equipment operators who might be employed in reclamation work. It is essential that well qualified people be employed in every phase of reclamation, from first removal and segregation of topsoil, to physical restoration of the surface, and finally, to replanting and revegetation for subsequent management of the site.
- (4) Some old, poorly reclaimed surface mines sites, in mountains, foothills and prairies should be acquired by the Government, and used as training sites and experimental areas for reclamation technology training and research.
- (5) Licensing of reclamation technologists should be considered, both for those employed by coal mining companies, and for Government inspectors who will have the responsibility for approving reclamation procedures carried out by mining companies.
- (6) As a final recommendation, it is suggested that the Authority's



Public Advisory Committee on Environmental Education be asked to review the potential for offering reclamation technology training in technological institutes, community colleges and universities, both at the technician level and at the degree level.

## 6.6 ENERGY REQUIREMENTS, ECONOMICS AND SOCIAL BENEFITS

### 6.6.1 Thermal Coal and Utility Needs

Mining of thermal coal was discussed earlier, under 6.3.1, but is considered by the Authority to be of such importance to the Province that it should again be emphasized. Aside from the consideration which must apply to successful reclamation, the question of economic benefit to the Province is of paramount importance. Thermal coal may exist in such quantities in some deposits as to have a value of many thousands of dollars per acre. All thermal coal being mined in Alberta is presently being used by Alberta utilities, or in a minor way, in coal fired furnaces for direct heating. With depletion of natural gas reserves and a limited hydro potential, Alberta thermal coal appears to be potentially the best single energy source available for the future.

Energy costs are highly variable across North America, partly because of the location of energy sources, such as hydro, natural gas and coal. Even a cursory examination of rate structures for utilities supplying electricity for domestic and industrial purposes suggests that Alberta constitutes a low cost energy island, surrounded by high cost energy supply areas. The mill rate value of thermal electricity in Alberta is considerably below the Canadian, or North American average.

In the generation of thermal electricity, the major environmental disturbance arises from the operation of strip mines, whereas the major benefit to the community arises from the electrical generating plant. The benefits to Alberta of the development of prairie coal deposits through their conversion to electric energy or gas have great importance in the economic future of the Province. As such, they should be carefully evaluated.

Recommendations Concerning Sub-bituminous Prairie Coals

- (1) In order to maximize community benefits from surface mining of prairie coals, as against environmental disbenefits, all efforts should be made to convert coal to electric energy or gas, before its use, inside or outside Alberta.
- (2) It is recommended that attention be given and appropriate studies be made on a continuing basis of the gasification and other ways of utilizing sub-bituminous coals as energy resources.
- (3) The relative economic advantage or disadvantage to the Province of Alberta of exporting any quantities of thermal coal to other parts of Canada should be compared with the use of the coal within Alberta to generate electric power for use within the Province and for export.
- (4) Reclamation costs which are shared with other operating costs should be assessed on a proportionate basis. The total reclamation costs calculated in this way should be used to assist in setting performance guarantees and their progressive release.
- (5) All reclamation costs should be included as part of the mining costs and should be included in the market price of the coal.
- (6) The environmental, social, economic and employment benefits and disbenefits of developing prairie thermal coal deposits should be analyzed and published as part of the comprehensive planning required of Government.
- (7) In summary, the planning of strip mining to develop prairie thermal coal deposits should be integrated into a comprehensive land management program.

#### 6.6.2 Bituminous Coal and Export Markets

Difficulties encountered in mining bituminous (coking) coal deposits of Alberta were presented in detail in Section 6.3.2, which deals with foothills and mountains. There were few data presented at the public hearings with respect to the economics of mining coking coal. It was generally suggested by most mining company submissions that export market prospects were not as lucrative as the public supposed. In addition, most companies had experienced physical difficulties in operating surface mines.

It has been indicated several times in preceding sections that pre-planning must be applied in all phases of surface mining activities in the foothills and mountains, in order to minimize environmental problems. Of no less importance to the Province is the early assessment of economic benefits and costs associated with development of the coking coal mining industry. All costs, including those associated with reclamation, are important in assessing the net economic benefit to Alberta. It is of importance to ensure that environmental costs are exported, if the product is exported, and are not borne by Albertans or other Canadians as hidden costs, in the form of concessions or the depreciation of other resources.

#### Recommendations Concerning Mining of Bituminous Coals

- (1) The Foothills Resource Allocation Study, now underway should be completed as soon as possible. With that study as a base, comparisons should be made of the economic values of the coking coal resource and the other resources of the foothills and mountains.
- (2) When a resources inventory and economic analysis is available, benefit/cost analysis should be used to make comparisons between alternative uses of foothills and mountain resources.
- (3) The planning of future surface mining activities in foothills and mountains clearly require integration into a comprehensive land management program, in order to achieve maximum social and economic benefits from exploitation of bituminous coal deposits.

- (4) Because surface mining will be able to achieve the extraction of only a small proportion of the total coal deposits of the foothills and mountains, underground and other mining technologies should be reviewed and be kept updated, in order to provide alternative coal extraction methods.

#### 6.6.3 Social Effects of Reclamation

In a general way the introduction of sound environmental management practices into resource industries increases the number of jobs the industry offers at the resource development level. This is important in a province that relies heavily on resource industries, particularly if the bulk of the resource production is exported. The net result is the retention of a greater portion of the resource dollar within the province, since the increase in jobs is retained in the province whereas the cost of them is exported in the price of the commodity.

A balancing factor could arise if environmental protection measures were so severe as to close down an industry or if the costs of environmental management were so high as to price the product out of markets. An effect of this sort is more likely in an old established operation than in a new one and in that case might have undesirable effects on the economic stability of existing communities. The gains and losses in employment from these related causes can sometimes be foreseen, and must clearly be taken into consideration when it is possible to do so.

Another problem that can arise is the scale at which work must be done to satisfy the requirements of environmental management. If these are so onerous as to limit the opportunity for developing a resource industry only to companies and corporations that have immense financial resources, then a specific social result comes about. In essence a small operator, and perhaps even medium sized operators are denied entrance into a field that would otherwise be open for their enterprise and initiative. Moreover the field is left then to the exclusive exploitation of very large companies, often based outside the country. It is important that unfortunate social consequences of this sort be avoided.



### Recommendations on Social Effects of Reclamation

- (1) Steps should be taken to ensure that Albertans and other Canadians can take full advantage of the opportunities for additional employment and enterprises that may be provided by environmental management.
- (2) Opportunities for new employment for Albertans should be maximized by ensuring that environmental management technology is fully applied in all phases of surface mining and reclamation.
- (3) Adequate opportunity should be provided through regulations or other devices for new, local companies and smaller operators to continue to have access to the coal resource.

## 6.7 LEGISLATION, REGULATION, ENFORCEMENT AND PUBLIC HEARINGS

### 6.7.1 Legislation

Many of the recommendations contained in previous sections may be applied directly in legislation. Nevertheless, there are several broad areas concerning new enactments and application of regulations which should be emphasized. Responsibilities for various environmental aspects of coal mining activities may be found presently in several acts or sets of regulations, depending on the location or effect of the operation or the interests of the government agency involved. Federal, Provincial, Municipal or Regional jurisdictions may be involved, either singly or jointly.

Effects of mining activities may be local, regional, provincial or interprovincial in the nature of their environmental effects and interprovincial, national or international in economic impact. The foothills and mountain coal deposits are of particular significance to Federal-



Provincial policies with respect to National Parks and recreational and industrial developments on the east slopes of the Rocky Mountains and foothills.

#### Recommendations for Enactment of New Legislation

- (1) Legislation should provide for the definition of roles and implementation of inter-jurisdictional concerns and responsibilities.
- (2) Because of inter-Provincial and Federal-Provincial jurisdictional overlaps, the legislation should empower the Minister to enter into agreements for the establishment of Federal-Provincial and interprovincial committees and task forces, which could advise on interjurisdictional problems.
- (3) Legislation should be broadly based and should stress integrated planning and preventive measures, in order to relieve environmental impacts, rather than post-mining remedial measures as an attempt to repair environmental damage.
- (4) Authority should be provided in reclamation legislation for establishment of two coal mining zones, with the plains as one zone and the foothills and mountains as the other.
- (5) Boundaries of the two mining zones should be determined initially on the basis of type of coal, pitch of seam and altitude of site.

#### 6.7.2 Regulations

It has been stressed previously, and is again emphasized, that very large differences exist in prairie, foothill and mountain surface mining. The objectives of any regulations are involved with protection of the public interest combined with a minimum of interference with industry and minimum necessity for on-site supervision. Regulations of necessity must therefore be strong, clear and as simple as possible, capable of ease of enforcement, without the necessity of complicated interpretation by enforcement officers and companies alike.

Because of widely differing conditions throughout the Province, regulations must be realistic in order to be workable. Each mine will have problems unique to that site, as is the case with forest sites where saw timber or pulpwood is being harvested. Regulations for surface mining should maintain the objective of ensuring a productive surface in perpetuity.

#### Recommendations Concerning Regulations

- (1) Recognition in regulations should be made of the location within a zone of a surface mine site, with respect to its sensitivity and human and ecological impacts, related to latitude, altitude, temperature and precipitation regimes, slope, drainage patterns and vegetal cover.
- (2) Regulations generally should place their emphasis not on the authority to exclude an operation potentially harmful to the environment, but rather on criteria which will prevent environmental damage.
- (3) Notwithstanding the general statement immediately preceding, the Minister should be provided the authority in regulations to terminate any activity which is environmentally harmful.
- (4) The Minister should be provided authority in regulations to reserve any site against surface disturbance because of the sensitivity factors discussed in Section 6.3.2, dealing with foothills and mountains.

#### 6.7.3 Enforcement

Legislation provides the legal basis for constructing regulations, which in turn provides avenues by which legislative intent is implemented. To be effective, regulations must be enforced strongly, with fairness and common sense. Enforcement of regulations must implement, in the most practical way, the intent of legislators. Enforcement of regulations is enhanced by the quality of the regulations, as well as by the knowledge and ability of enforcement officers to apply regulations to any given situation.

### Recommendations Concerning Enforcement

- (1) Coordination of responsibilities of the various Government agencies for control of surface disturbances should continue to reside in the Department of the Environment.
- (2) Reclamation and other inspectors should be employed as needed to supervise each step in a surface mining development.
- (3) Reclamation inspectors should be trained at an adequate technical level, in order to evaluate and supervise multiple resource use problems associated with surface mining.
- (4) In the case of Crown Lands, the inspectors should be empowered to involve field staffs, such as District Agriculturists from the Department of Agriculture, Regional Biologists or Foresters from the Department of Lands and Forests, Regional Engineers from the Water Resources Division of the Department of Environment, etc.
- (5) Where private lands are involved, it is recommended that in addition to Government personnel, regulations specify that plans be approved by the landowner, who should be involved with the mining and reclamation plan and inspector from the initial stages of application for a mining permit.
- (6) Inspectors should have authority under the regulations for on-site inspection at all times, plus the full authority on behalf of the Minister to suspend an operation for non-compliance with regulations.
- (7) Finally, it is recommended that the Minister have the overriding authority for enforcement decisions respecting reclamation of disturbed areas, and decisions on major resource developments which relate to the public benefit in relation to environmental impact.

#### 6.7.4 Public Hearings

A strong public demand is evident for a share in resource policy formulation, particularly where competition occurs for use of land which has several potentials. Public hearings make available as much information as possible to the public, as well as providing a vehicle through

which the public can express its wishes to its government. In the present case, all segments of the public, from concerned preservationist to industrial developer, expressed the view that the public hearing is a valuable mechanism to facilitate the exchange of information between opposing parties. All submissions indicated that the public hearings reinforced the principle of public accessibility to Government, and that continuing public debate on allocation of resources through public hearings was desirable.

#### Recommendations Concerning Public Hearings

- (1) Public hearings are recommended under certain conditions, when new surface mining operations are proposed.
- (2) A requirement for a public hearing should be mandatory on the Environment Conservation Authority at the request of the Minister, or permissive upon public petition to the Minister or to the Authority.
- (3) It is recommended that an environmental impact statement should be filed with the Authority, as well as with the Government department or agency authorized to grant permission to proceed with development of a surface mine.
- (4) The Authority should be required to publish environmental impact statements, as notice to the public of the intention of Government to consider development of a surface mine.
- (5) Publication of the environmental impact statement should specify the conditions under which a public hearing might be held.
- (6) If a request from the Minister, or objection or petition from the public has been received, the publication by the Authority of the impact statement should include a statement that a public hearing will be held.
- (7) It is recommended that the stop order procedure be used to halt an operation, if an operator cannot or will not agree to operate as the regulations require.
- (8) It is recommended that the Authority report its findings from a hearing and make its recommendations to the Minister of the Environment.

## **7. CONCLUSION**





In conclusion the Authority once more wishes to express its sincere appreciation for the time and effort which were contributed so generously by so many people in the conduct of these Hearings. The position is accepted, that every submission verbal or written demands complete and careful study and the Authority feels satisfied that it has fulfilled this commitment. Its conclusions arise from the submissions of many concerned citizens. To the extent that they have been properly understood and interpreted the Authority now feels confident in respectfully submitting the foregoing recommendations.

ENVIRONMENT CONSERVATION AUTHORITY

W R Trott  
Chairman

A B Shink  
Member

## **8. APPENDICES**



## APPENDIX 1

### SUMMARY OF CONSULTANT'S REPORT

The consultant's report provides a broad outline of environmental problems which might be associated with surface coal-mining operations, including exploration, extraction, processing and transport. A review of the effects of surface coal mining on other natural resources, together with an impact appraisal and suggested general approaches to responsibility for remedial measures and regulatory controls is presented (It should be emphasized that the consultant's report was presented as a situation statement for public discussion and the Environment Conservation Authority does not take the position of necessarily agreeing or disagreeing with any or all of the statements in the report).

#### Regional Aspects of Coal Mining in Alberta

Three physiographic regions are considered in the report - Mountains, Foothills and Plains, and identify possible environmental impacts with respect to the following:

Mountains - Steep slopes, glaciated valleys, sub-alpine forests and alpine tundra, short growing seasons, severe climate and thin, easily disturbed soils; a delicately balanced complex of soil, water and vegetation, with high watershed, wildlife, aesthetic and recreational values, easily susceptible to damage and slow to heal.

Foothills - transition area between the plains and mountains, traversed by numerous watercourses, including several major rivers; watershed, fisheries, wildlife, forestry, range and recreational values high, with susceptibility to damage high, but possibly less than in the mountains.

Plains - flat to gently rolling topography with several ecological types including prairie grassland, aspen parkland, aspen-spruce mixed forest, mixed coniferous forest; farming, ranching, forestry and wildlife resources predominant; susceptibility to permanent damage lower than in the mountains and foothills.

### Exploration, Extraction, Processing and Transportation

The report indicated that coal production in Alberta rose from 4.5 million tons in 1969 to 6.7 million tons in 1970 and was likely to be increased considerably. Coal on the plains is largely sub-bituminous, suitable for thermal electric plants, while much of the coal in the foothills and mountains is suitable for coking coal. Difficulties of mining in steep terrain on the foothills and mountains, plus folding and faulting of seams, make it unlikely that many more surface mines will be developed in these areas in the future. Most, if not all deposits underlying the plains are potentially mineable by surface methods. Although the total area disturbed by surface mining in Alberta is small in relation to the total area of the Province, effects caused by siltation, pollution and transportation may be much larger than the area actually disturbed by extraction. Exploration for coal has, and potentially could, continue to disturb much more surface acreage than actual mining operations.

### Environmental Impacts

Physical and chemical impacts may occur from surface mining activity. Sheet or gully erosion is more likely to occur and to have more widespread effects in mountainous and foothill terrain than in the plains. Erosion and siltation effects can result from (a) exploration (b) actual mining operations (c) exploration roads or coal haul roads. Slides may occur either from slippage of disturbed slopes or from movement of spoil piles. Chemical impacts are likely to be of minor concern in Alberta as coals are low in sulphur. Increased alkalinity or precipitation of iron compounds may be considered as possible hazards to mountain streams. Processing plants pose hazards from waste disposal.

### Protective, Remedial and Restorative Measures

Pre-planning of the total mining operation is cited as the most effective measure in prevention of deleterious effects, in remedial measures if damage does occur, and in reduction of expenditures of labor and capital before exploration and extraction begins, during the mining process and in the post-mining reclamation and abandonment

of mining properties. Of particular significance is the attention which must be paid to drainages, which may be affected by exploration and haulage roads, overburden removal and waste piles. Finally, pre-planning should take into account the eventual necessity for removal of all facilities, such as buildings and processing plants.

In mountains and foothills, pre-planning must take into account the inherent instability of slopes disturbed by road construction and open pits. If reclamation and revegetation is to be successful, the generally sparse topsoil must be carefully conserved, in order that replacement may be effected at minimum cost to the operator, and for maximum effectiveness in permanent restoration of disturbed areas. Slope instability is of minor concern in open pit coal operations on the plains, but pre-planning, including conservation of topsoil, will ensure similar economics and higher probabilities for permanent reclamation in plains operations as those cited for mountains and foothills.

#### Environmental Impacts and Other Resource Use

Integrity of watersheds is related to almost all other resources and their beneficial uses. The prime importance of the Saskatchewan River System to 87 percent of the population in Alberta and 42 percent in Saskatchewan, as well as the importance of the Peace and Athabasca systems to Alberta and northern areas, is listed therefore as one of the highest priority, with respect to surface mining effects. Effects on a variety of related ecosystems may be felt well beyond the actual mining operation. Wildlife may be affected by destruction of habitat, interruption of seasonal migration patterns and behavioral disturbance, resulting in prevention of use of even undisturbed habitat. Effects on fish may be direct, through physical or chemical alteration in water quality, or in effects on invertebrates which constitute food supplies for fish populations. Effects on fish and wildlife have direct consequences on recreational values involved in sport fishing and hunting, as well as on aesthetic, scientific and educational values inherent in undisturbed land. Such effects of surface mining operations are highest in foothill and mountain areas, but also may be significant on the



plains. Forest land may be permanently impaired by significant acreages affected by exploration and haul roads, and grazing areas of importance to the ranching industry may be similarly affected. On the plains, of greatest concern is the potential acreage of land which could be removed from cereal production.

#### Preventing and Minimizing Environmental Impact

Post-mining use of disturbed land should be related to current and projected use of the surrounding area in order that use of reclaimed land compliments adjacent land use. A management plan for reclaimed land should be as important as the reclamation plan itself. Impact studies should consider climate, topography, drainage, soils, vegetation, fish and wildlife, access, human interest areas, settlements and resource use patterns. Management plans will not be effective unless properly supervised by personnel trained and experienced in each phase of the operation, from exploration through extraction, processing, shipping and eventual abandonment of the mine site.

#### Reclamation

As stated earlier, successful reclamation of surface mine sites is heavily dependent on pre-planning. Actual site preparation for reclamation involves grading, back-filling, soil replacement, drainage and preparation of an adequate surface seed bed. Revegetation is the primary objective in the shortest time, in order to prevent erosion from wind or water, and to minimize slippage of surface materials. The requirements will vary according to the effects of topography, slope, altitude, precipitation and surface characteristics. In general, establishment of vegetal cover will become progressively more difficult from the plains through the foothills to the mountains, and from south to north. Proper reclamation can lead to better land use than before mining on the plains.

### Benefits and Costs of Surface Coal Mining

Data on the past or present surface mining operations are not included in the report; thus benefit/cost comparisons are on a theoretical basis. Direct benefits are identified as direct payments to land, labour and capital. If profits are sent out of Alberta, payments to non-resident capital are not benefits. Direct costs of using land, labour and capital are "opportunity costs", or earnings they could command in another use, such as for cereal production, grazing, forestry, recreation, etc. Creation of jobs are direct benefits only to Albertans who would be otherwise unemployed. Similarly "multiplier" or secondary effects likely would be as great if the land, labour and capital resources were used in some other industrial activity. Benefit-cost analysis is useful in providing choices of activities. Early analysis tended to overlook ecological, recreational and aesthetic values, but these are now being included. Royalties, wages and profits are relatively easy to assess, but ecological, recreational and aesthetic values are more difficult to measure, as is the depreciation of Crown land. Opportunity costs of land labour and capital can be assessed as can depreciation in value of private land. Without substantial economic data, it is difficult to measure the direct and indirect benefits and costs, but in making decisions all known economic variables must be considered. Because it is impossible to include quantitative data on some effects of surface mining, subjective decisions must be made as to whether the social costs and risks are offset by the benefits. If there is no way of preventing undesirable social costs, and the public is unwilling to accept such costs (such as the impairment of water quality in a large river system), the choice may be to prohibit that particular operation.

Responsibility for the costs of remedial measures rests with the company causing the problem. Beyond the point of profitability the company has the alternatives of (1) closing down, (2) increasing efficiency of operation, (3) reducing royalty payments or environmental standards. The third alternative is not acceptable unless the social benefits exceed social costs, such as creating the only employment potential in an area.

### Recommendations and Guidelines

The consultant's report listed several recommendations, chief of which suggested that conflicts of resource use should be resolved within the confines of land use policies and defined land management zones, and that these apply equally to Crown and to private lands. Review of applications for coal operations, plus use of legislation and regulations should be flexible, in order to accommodate the wide variety of operating conditions which will occur. A number of Federal and Provincial acts were listed which might apply to coal mining operations, in order to point out the broad scope of interest in surface mining operations. It was suggested that management plans, submitted with applications for operations, should describe the nature, extent and environmental impact of the operation; measures should be stated which would lessen the environmental impact, the projected use after mining and measures proposed to achieve that use should be included in the management plan. Mechanisms should be provided for continuing dialogue between operators and regulatory bodies. Qualified inspectors should be employed to supervise all stages of operations, including the monitoring of environmental impact and reclamation procedures conducted by the operators.

Future activities were suggested in the following areas:

- (1) Accumulation of primary statistics which should be published.
- (2) Coordination of reclamation research and trials, between the industry and government and between operating companies, in order to avoid duplication and to provide a fund of knowledge.
- (3) Establishment of acceptable standards for watershed integrity and water quality, as well as for fish and wildlife requirements.
- (4) Initiation of ongoing economic studies, to provide a readily available base for decisions affecting the coal industry and other resources.

## STATISTICAL ANALYSIS OF SUBMISSIONS

| <i>Subject Material from<br/>Briefs</i> | <i>Industry</i> | <i>Govern-<br/>ments &amp;<br/>Planning</i> | <i>Associations and Organizations</i>              |                              |               |                            |              | <i>Indi-<br/>viduals</i> | <i>Totals</i>    |                             |
|-----------------------------------------|-----------------|---------------------------------------------|----------------------------------------------------|------------------------------|---------------|----------------------------|--------------|--------------------------|------------------|-----------------------------|
|                                         |                 |                                             | <i>Recreation<br/>&amp;<br/>Conser-<br/>vation</i> | <i>Fish and<br/>Wildlife</i> | <i>Labour</i> | <i>Anti-<br/>Pollution</i> | <i>Other</i> |                          | <i>Concerned</i> | <i>Negative<br/>Concern</i> |
| <u>CONCERNS</u>                         |                 |                                             |                                                    |                              |               |                            |              |                          |                  |                             |
| Deterioration of wildlife<br>habitat    |                 | 2                                           | 5                                                  | 5                            | 1             | 1                          | 2            | 6                        | 22               | 2                           |
| Water a) effects on flow                | 1               | 5                                           | 5                                                  | 4                            | 1             | 1                          | 2            | 1                        | 20               | -                           |
| b) sedimentation                        | 1               | 2                                           | 4                                                  | 4                            | 1             | 1                          | 1            | 2                        | 16               | -                           |
| c) chemical pollution                   | -               | 2                                           | 3                                                  | 5                            | 1             | 1                          | -            | 1                        | 13               | 5                           |
| Erosion                                 | -               | 2                                           | 4                                                  | 4                            | 1             | 1                          | 3            | 1                        | 16               | -                           |
| Land disturbance                        | -               | 1                                           | 4                                                  | 2                            | 1             | -                          | 1            | 4                        | 13               | 2                           |
| Alternate uses more<br>economical       | -               | 2                                           | 3                                                  | 1                            | -             | 1                          | 2            | 4                        | 13               | -                           |
| Conflict with recreation                | 1               | 1                                           | 6                                                  | 1                            | -             | 1                          | 1            | -                        | 11               | -                           |
| Road location and<br>construction       | -               | 1                                           | 1                                                  | 3                            | 1             | 1                          | -            | 1                        | 8                | -                           |
| Damage to vegetation                    | -               | -                                           | 1                                                  | -                            | 1             | 1                          | 1            | 2                        | 6                | -                           |
| Conflict with wilderness<br>areas       | -               | -                                           | 2                                                  | -                            | 1             | 1                          | -            | -                        | 4                | -                           |
| Damage to fishing streams               | -               | 1                                           | 1                                                  | 1                            | -             | 1                          | -            | -                        | 4                | -                           |
| Air pollution                           | -               | -                                           | -                                                  | -                            | 1             | 1                          | -            | 2                        | 4                | 1                           |



[illegible]



| Subject Material from Briefs            | Industry | Governments & Planning | Associations and Organizations |                   |        |                |       |             | Totals    |                   |
|-----------------------------------------|----------|------------------------|--------------------------------|-------------------|--------|----------------|-------|-------------|-----------|-------------------|
|                                         |          |                        | Recreation & Conservation      | Fish and Wildlife | Labour | Anti-Pollution | Other | Individuals | Recommend | Recommend Against |
| <u>RECOMMENDATIONS</u>                  |          |                        |                                |                   |        |                |       |             |           |                   |
| Increased environmental research        | -        | 3                      | 4                              | -                 | 1      | 2              | 3     | 5           | 18        | -                 |
| Comprehensive land use Planning         | 2        | 3                      | 3                              | 2                 | -      | 1              | 3     | 1           | 15        | -                 |
| Mine operator develop reclamation plan  | 2        | 1                      | 2                              | 1                 | 2      | 3              | 2     | 1           | 14        | -                 |
| Operators post security bond            | 1        | 1                      | 4                              | 2                 | 1      | 3              | 2     | 2           | 16        | 1                 |
| Reclamation legislation be general      | 11       | -                      | -                              | -                 | -      | -              | 2     | 1           | 14        | -                 |
| Reclamation legislation be specific     | -        | -                      | 3                              | -                 | -      | -              | 1     | 2           | 6         | -                 |
| Cost benefit analysis before operations | -        | 1                      | 5                              | 1                 | -      | 2              | 2     | 2           | 13        | -                 |
| Former land condition preferred         | -        | 1                      | 6                              | -                 | -      | 1              | 1     | 1           | 10        | 3                 |
| Reclamation part of mining costs        | -        | 1                      | 3                              | 2                 | -      | -              | 3     | -           | 9         | -                 |

| Subject material from<br><i>Briefs</i>          | Industry | Govern-<br>ments &<br>Planning | Associations and Organizations       |                      |        |                    |       |                  | Totals         |                      |
|-------------------------------------------------|----------|--------------------------------|--------------------------------------|----------------------|--------|--------------------|-------|------------------|----------------|----------------------|
|                                                 |          |                                | Recreation<br>&<br>Conser-<br>vation | Fish and<br>Wildlife | Labour | Anti-<br>Pollution | Other | Indi-<br>viduals | Recom-<br>mend | Recommend<br>Against |
| Area Restrictions                               | -        | -                              | 2                                    | 3                    | -      | 1                  | 1     | 2                | 9              | -                    |
| a) Alpine areas                                 | -        | -                              | 1                                    | 1                    | -      | 1                  | 1     | 4                | 8              | -                    |
| b) ecological fragile<br>areas                  | -        | -                              | 1                                    | 3                    | -      | 1                  | 1     | 2                | 8              | -                    |
| c) Watersheds                                   | -        | -                              | 2                                    | 2                    | 1      | -                  | 2     | 1                | 6              | -                    |
| d) Wilderness areas                             | -        | -                              | 2                                    | 1                    | -      | 1                  | 2     | 1                | 5              | -                    |
| e) Scenic & Recreation                          | -        | -                              | 2                                    | 1                    | -      | 1                  | -     | -                | 4              | -                    |
| f) Steep slopes                                 | -        | -                              | -                                    | 1                    | -      | 1                  | -     | 2                | 4              | -                    |
| g) Wildlife ranges                              | -        | -                              | -                                    | 1                    | -      | 1                  | -     | -                | 4              | -                    |
| Qualified supervision of<br>reclamation         | 1        | 2                              | 2                                    | 2                    | -      | -                  | 1     | -                | 8              | -                    |
| Mine site eco-inventory                         | 1        | -                              | 3                                    | 1                    | -      | -                  | 3     | -                | 8              | -                    |
| Cooperative planning of<br>mining operations    | 6        | 2                              | -                                    | -                    | -      | -                  | -     | -                | 8              | -                    |
| Previous mined areas be<br>cleaned up           | -        | 1                              | 2                                    | 1                    | 1      | 2                  | -     | 1                | 8              | 5                    |
| Company participate in<br>reclamation standards | 5        | -                              | -                                    | -                    | -      | -                  | -     | -                | 5              | 1                    |
| Establish a data bank                           | 1        | -                              | 1                                    | -                    | 1      | 1                  | 1     | 1                | 6              | -                    |
| Establish land use zones                        | -        | 2                              | 1                                    | 2                    | -      | -                  | 1     | -                | 6              | -                    |
| Economic studies of mine<br>feasibility         | -        | -                              | 3                                    | 1                    | -      | -                  | -     | 1                | 5              | -                    |
| Reclamation standards be<br>area specific       | 1        | 2                              | -                                    | -                    | -      | -                  | 2     | -                | 5              | -                    |

| Subject material from Briefs                  | Industry | Govern-ments & Planning | Associations and Organizations |                   |        |                |       | Totals       |            |                   |
|-----------------------------------------------|----------|-------------------------|--------------------------------|-------------------|--------|----------------|-------|--------------|------------|-------------------|
|                                               |          |                         | Recreation & Conser-vation     | Fish and Wildlife | Labour | Anti-Pollution | Other | Indi-viduals | Recom-mend | Recommend Against |
| Stop orders be issued                         | -        | -                       | 2                              | 1                 | -      | 1              | -     | -            | 4          | -                 |
| Public assumes some finan-cial responsibility | 1        | 2                       | 1                              | -                 | -      | -              | -     | -            | 4          | 1                 |

#### OTHER RECOMMENDATIONS

No exploration in  
National Parks  
Bow Valley  
Foothills

Buffer zones by National  
Parks

Recover other resources  
besides coal

Company have right to  
appeal

Make legislation preventative  
Fines and imprisonment for  
failure to comply

Old strip mines used for  
miner and land use  
education

|                                                                                                    |          |                     |                           |                 | Associations and Organizations |                |       |             | Totals |    |
|----------------------------------------------------------------------------------------------------|----------|---------------------|---------------------------|-----------------|--------------------------------|----------------|-------|-------------|--------|----|
|                                                                                                    | Industry | Government Planning | Recreation & Conservation | Fish & Wildlife | Labour                         | Anti-Pollution | Other | Individuals | Yes    | No |
| <u>BENEFITS OF STRIP MINING</u>                                                                    |          |                     |                           |                 |                                |                |       |             |        |    |
| Provides recreation areas                                                                          | 1        | 1                   | 1                         | 1               | -                              | -              | 1     | 1           | 6      |    |
| Provides substantial employment                                                                    | 2        | -                   | -                         | -               | 2                              | -              | -     | -           | 4      | 4  |
| Important to economy                                                                               | 4        | -                   | -                         | -               | 1                              | -              | -     | -           | 5      | 3  |
| Provides wildlife habitat                                                                          | 1        | -                   | 1                         | -               | -                              | -              | -     | 1           | 3      |    |
| low fuel costs                                                                                     | 2        | 1                   | -                         | -               | -                              | -              | -     | -           | 3      |    |
| Other benefits:<br>provided water control<br>provided roads<br>tax benefits<br>jobs in reclamation |          |                     |                           |                 |                                |                |       |             |        |    |

|                                             | Associations and Organizations |                       |                           |                 |        |                |       | Totals      |     |         |
|---------------------------------------------|--------------------------------|-----------------------|---------------------------|-----------------|--------|----------------|-------|-------------|-----|---------|
|                                             | Industry                       | Government & Planning | Recreation & Conservation | Fish & Wildlife | Labour | Anti-Pollution | Other | Individuals | For | Against |
| <u>PROPOSED LEGISLATION</u>                 |                                |                       |                           |                 |        |                |       |             |     |         |
| Public participation in planning operations | 3                              | 1                     | 5                         | 1               | -      | 2              | 2     | 1           | 15  | 2       |
| Reclamation keep pace with mining           | 1                              | 2                     | 2                         | 3               | -      | 2              | 1     | 1           | 12  | 3       |
| Enforcement of standards                    | 1                              | -                     | 1                         | 1               | 1      | 1              | 1     | 2           | 8   | -       |
| Centralization of authority                 | 3                              | -                     | 1                         | 1               | -      | -              | 1     | 2           | 8   | 1       |
| Expropriation                               | 3                              | -                     | 1                         | -               | -      | -              | -     | -           | 4   | 5       |
| Pollutor pays                               | 2                              | -                     | -                         | -               | -      | -              | -     | -           | 2   | 1       |
| Minister able to make restrictions          | -                              | -                     | 1                         | 1               | -      | -              | -     | -           | 2   | 1       |
| Expropriate only if rules broken            | 2                              | -                     | -                         | -               | -      | -              | -     | -           | 2   | -       |
| <u>SUGGESTED NEW LEGISLATION</u>            |                                |                       |                           |                 |        |                |       |             |     |         |
| Apply to all surface disturbances           | 3                              | 1                     | 1                         | 2               | -      | 1              | -     | 1           | 9   |         |
| Operator proves environmental protection    | -                              | 2                     | 1                         | -               | -      | 1              | 2     | 1           | 7   |         |
| Have a reclamation time interval            | 3                              | -                     | -                         | -               | -      | -              | 1     | 1           | 5   |         |





### APPENDIX 3

#### PRINCIPLES OF PROPOSED LEGISLATION

##### 1.0 INTRODUCTION

The Alberta Government will introduce new surface reclamation legislation in the 1972 session. This decision is a result of an increasing awareness by the public and the expression of these concerns for the management of their environment to provide a balance between resource development and environmental matters. Although these concerns are generally directed to activities of the energy industry, and specifically surface or strip coal mining, other activities causing surface disturbances are being identified. They include road construction, sand and gravel operations, sanitary land fill and waste burial, agricultural and forest land clearing, water impoundment and conveyancing facilities and a host of others.

In order to provide the general public as well as the various industries and municipal governments the opportunity to express themselves on the type of legislation and the degree of regulation that should control surface disturbances of the environment, the Government has directed the Environment Conservation Authority to hold several public hearings throughout Alberta in mid December. On this basis, the Authority will make recommendations to the Government, reflecting the public's wishes. The Government will take this into consideration in drafting the necessary legislation and regulations.

However, in order that the general public, the various industries and the municipal governments have a common understanding of the philosophy, conceptual framework and principles of the proposed legislation, it is necessary to introduce a draft position statement which can be used as a basis for discussion at the hearings. This statement should not be misconstrued as the final document or even exhaustive in scope, but could provide the central theme on which briefs to be presented at the hearing could be based. Some briefs would provide

additional suggestions which would be considered in the recommendations to the Government. It would be hoped that in this manner the public, as well as the resource managers and users would all contribute in the development of the necessary legislation.

## 2.0 PHILOSOPHY OF PROPOSED SURFACE DISTURBANCE LEGISLATION

### 2.1 Situation Statement

The domestic and foreign demands for the supply of Alberta's renewable and non-renewable resources will continue to accelerate in the foreseeable future. Population growth, coupled with the need for more job opportunities and energy requirements in an industrializing economy will place a greater stress on the environment in relation to resource exploitations, both in extent of operations as well as intensity of development. The proposed legislation would strike a balance in order that optimum resource development could proceed.

### 2.2 Emphasis on Prevention of Environmental Damage

This stress on the environment however, can be identified before it is permitted to cause degradation in order that its impact is subsequently minimized. The proposed legislation envisages comprehensive environmental planning before the fact, in order that the emphasis is placed on prevention of damage or the controlled occurrence of damage with the remedial measures known before it occurs as opposed to remedial measures after the fact.

### 2.3 Responsibility of Action on Resource User

At present the environmental philosophy appears to place the resource manager or the public in the unfortunate position of proving the nature and extent of damages before the resource user can be held responsible. The proposed legislation would place the responsibility on the resource user to identify the nature and extent of damages and to prove to the satisfaction of the resource manager that they would not result in irreparable damage or that necessary corrective action could overcome the damages.

#### 2.4 Compensation Required for Environmental Damages

Many forms of surface disturbance resulting from numerous resource development activities cause irreparable damage to unique features of the environment. The legislation being proposed would require the resource user to bear the financial cost of replacing or recreating alternative features or compensating society in the form of a financial assessment paid to the Government for the irreparable loss of the feature. This is similar to the "polluter must pay" concept. This "cost" may actually be an "investment" resulting in benefits to the industry.

#### 2.5 Privileges as Opposed to Rights

In many aspects, the use and exploitation of resources is considered a perpetual right enjoyed by those holding an interest in them. It is proposed that this is a privilege which can be made conditional, renewed or terminated as the balance between resource development and environmental matters may determine.

#### 2.6 Public Hearings on Environmental Matters

At the present time, few development proposals aside from energy matters are subject to public hearings. The proposed legislation would make it mandatory that specified resource allocation developments of an irreversible nature could require public debate in the Legislature and that other developments would require public hearings to expose the full nature of their environmental impact before action proceeded.

#### 2.7 Delegation of Administrative and Enforcement Responsibilities

The proposed legislation would encourage participatory planning by delegating responsibilities to those departments or administrative agencies of government or municipal governments to ensure the most effective application of the statute and enable the administrative unit with the required expertise and capability nearest to the problem to share in the planning and execution process.

### 3.0 CONCEPTUAL FRAMEWORK

The proposed legislation is intended to be broad in application to those surface disturbance activities having an impact on land and subsequently on the environment. It is intended that the Act would stipulate the powers and responsibilities of the Government and that regulations pursuant to the Act would apply to the various surface disturbance activities with respect to administration standards, approvals, enforcement, delegation of powers, etc.

#### 3.1 Definition of Surface Disturbance

It is proposed within the legislation that the term "surface disturbance" would include at least the following three activities:

- 3.11 the removal and/or exposure of the land surface,
- 3.12 the removal of vegetation and/or water which results in the exposure of the land surface,
- 3.13 the covering up of the original land surface with water and/or solid cover.

#### 3.2 Geographic Area of Application

- 3.21 It is proposed that the legislation would apply to all land situated within the Province subject to The British North America Act and The Alberta Natural Resources Act which may exclude certain lands.
- 3.22 It is proposed that the legislation would apply to all public lands as well as all patented lands and that the regulations would be applied with equality.

#### 3.3 Consolidation of All Activity Phases and Sequences

The regulations pursuant to the legislation being proposed would include all the various phases of resource development having a surface disturbing impact on the environment, i.e., exploration, development, operation, processing, transportation, storage, servicing, reclamation, abandonment, etc. Often, only one specific activity has been considered, which becomes distorted out of context to the entire sequence. It is



intended that a program of activities including the entire series of sequences be regulated in context. In addition, the administration would be interdepartmental to such an extent that unilateral departmental or single disciplinary action could not occur.

### 3.4 Binding the Crown and its Agencies

The proposed legislation would include actions taken by the Crown as well as its agencies in addition to the actions of others.

## 4.0 PRINCIPLES INCLUDED IN THE PROPOSED LEGISLATION

### 4.01 Acquisition of Rights

The legislation would provide for the acquisition of rights to the resources in order to guide, control or deny their use and subsequent environmental impact as follows:

4.011 surface title

4.012 surface rights or interest and control of use in them

4.013 subsurface mineral title

4.014 subsurface mineral interest.

### 4.02 Methods of Acquisition

The legislation would prescribe the means of acquisition of these rights and interests including:

4.021 negotiation for exchange

4.022 purchase

4.023 expropriation procedures for surface and subsurface rights.

### 4.03 Arbitration and Appeal to Courts

The legislation would provide for arbitration and appeal to the courts in matters of law with regard to acquisition of rights and interests as well as the implementation of plans and approvals.

#### 4.04 Natural Resources Transfer Agreement

The legislation would provide for the acquisition of mineral interests granted prior to October 1, 1930 by the federal government.

#### 4.05 Compensation by the Crown

The legislation could provide for loss of right or interest in the form of compensation in specific cases where approved by the Lieutenant Governor-in-Council.

#### 4.06 Application and Approval

The legislation would emphasize a comprehensive environmental planning process including a review of development proposals prior to three specific events in order that environmental matters are considered:

- 4.061 prior to the proposed sale or renewal by the Crown of a resource disposition in order to predetermine the potential environmental degradation,
- 4.062 prior to the issue of the necessary exploration permit in order that the terms and conditions for exploration and reclamation are defined,
- 4.063 prior to the approval to proceed with the resource development in order that all factors of development and reclamation, including subsequent surface land use, are satisfactorily agreed to.

#### 4.07 Reclamation

The legislation would provide that reclamation of disturbed lands would proceed simultaneously with operations in order that the period of disturbance would be limited.

#### 4.08 Regulations

The legislation would provide for specific regulations encompassing various types of surface disturbing activities including petroleum and natural gas operations, coal mining, clay and marl quarrying, sand and gravel excavation, resource road construction, water impoundment and

conveyancing facilities, sanitary land fill and waste burial, and land clearing for agricultural and forestry purposes.

#### 4.09 Guidelines

The legislation would provide for approved guidelines by which exploration development and reclamation proposals would be assessed in the planning process.

#### 4.10 Power of the Minister

The legislation would provide for the authority to prohibit, prevent or minimize the following:

- 4.101 the physical erosion of the land surface,
- 4.102 the physical, chemical or biological degradation of the land surface,
- 4.103 the cultural, scenic and aesthetic deterioration of the land surface.

#### 4.11 Retroactive Application

The legislation could provide for a retroactive feature which would place the responsibility for reclamation of previously disturbed land as specified in accordance with the Act, on the surface disturber. The length of the retroactive feature would be specified in the Act.

#### 4.12 Security Deposit

The legislation would provide for the authority to specify by regulation a financial security deposit to ensure satisfactory compliance with the approval for reclamation purposes.

#### 4.13 Forfeiting of Deposit

The legislation would provide for the forfeiting of the security deposit where the reclamation was not undertaken or was not satisfactory.

#### 4.14 Certificate

The legislation would provide for the issuance of a certificate attesting to the satisfactory completion of the reclamation.

#### 4.15 Penalties

The legislation would provide for financial penalties as well as imprisonment for convicted violators of the Act.

#### 4.16 Severability of the Act

The legislation would be severable in the event that a specific section were declared ultra vires by the court.

### 5.0 CONCLUSION

This is the proposed content of the legislation. Briefs received during the public hearings as well as many other considerations will all have a bearing on the content of the Bill when it is introduced to the 1972 session of the Legislature.

If you have an interest to express, this is your opportunity to do so.

APPENDIX 4

ROSTER OF BRIEFS

PRESENTED AT GRANDE PRAIRIE

Organization

Peace River Regional Planning Commission  
Proctor and Gamble Cellulose Limited  
Wild Kakwa  
Unifarm, Region I  
Wapiti Fish and Game Association  
Liberal Party in Alberta  
Big Game and Guide Outfitters  
  
British Columbia. Peace River-Liard  
Regional Planning District

Presented By

G. Allen  
D.D. Schores  
J. Brakenbury  
M.C. Longson  
H.E. Bayly  
A.S. Romanchuk  
G.E. Hodges and  
E. Lightfoot  
  
D.F. Holluraus

PRESENTED AT LETHBRIDGE

Pollution Control - Southern Alberta  
Lethbridge Fish and Game Association  
Coleman Collieries Limited  
Lethbridge Natural History Society  
I - XL Industries Limited  
  
Oldman River Regional Planning Commission  
Unifarm Region 14  
City of Lethbridge  
Private  
Private  
Rocky Mountain Ramblers Association  
Alberta Fish and Game Association, Zone I  
  
City of Lethbridge

P. Lewis, Ph.D.  
G.M. Pittman  
E.D. Jamieson  
F. Schultz  
L.O. Lindoe and  
I.G. McLaughlin  
J. Nicholson  
W. Nicol  
J. Hammond  
W. Michalsky  
E. Davidson  
H.G. Peck  
T. Psaltis, read by  
F. Schultz  
Mayor H. Anderson



PRESENTED AT EDMONTON

Organization

Research Council of Alberta. Geology Division  
Calgary Power Limited  
Edmonton Chamber of Commerce  
Luscar Limited  
STOP (Save Tomorrow, Oppose Pollution)  
Private  
Alpine Club of Canada. Edmonton Section  
Private  
Pegasus Experimental Metals and Mining Limited  
National and Provincial Parks Association of  
Canada. Edmonton Chapter  
St. Albert Fish and Game Association  
Sterling Coal Valley Mining Company  
Canadian Utilities Limited  
McIntyre Coal Mines Limited  
Private  
Interdisciplinary Committee for  
Environmental Quality  
Private  
Edmonton Natural History Club  
Macroplan Consultants Limited  
Alberta Geographical Society  
Alberta Fish and Game Association  
The Wighton Family  
International Union of Operating  
Engineers  
Private  
Communications Employee's Fish and  
Game Association

Presented By

G. B. Mellon, Ph.D.  
T. D. Stanley  
E. K. Cumming  
G. Coates  
K. Molgaard  
A. James  
J. Creore  
P. H. Bouthellier and  
W. L. Bigg  
A. Fennel  
D. Meredith  
G. Stretch  
C. Roberts  
G. Cameron  
T. L. Bedard  
M. Gawlak  
E. E. Daniel, Ph.D.  
C. Lacy  
G. C. Hamilton  
G. R. Shelly  
R. Whistance-Smith  
G. Peel  
C. Wighton  
I. C. Nessel  
W. M. Schultz, Ph.D.  
W. G. Pigeon

PRESENTED AT CALGARY

Organization

Coal Association of Canada  
Canada. Department of Indian Affairs and  
Northern Development. National and Historic  
Parks Branch  
Alberta Coal Limited  
S.P.E.C. (Society for Pollution and  
Environmental Control)  
Canmore Mines Limited  
Canada. Department of Environment  
F. Brown and R. C. Brown  
The Calgary Field Naturalists' Society  
National and Provincial Park Association.  
Calgary/Banff Chapter  
Archaeological Society of Alberta. Calgary Centre  
Alberta Federation of Labour, C.L.C.  
The Alberta Economic Development Productivity  
Council  
Calgary Eco-Centre Society  
Consolidation Coal Company of Canada  
Unifarm  
Alberta Wilderness Association  
Ratepayers of Harvie Heights. Committee on  
Rundle Mountain Strip Mine  
Private  
Bow Valley Naturalist Society  
Hook and Hackle Club  
United Mine Workers of America  
Private

Presented By

G. Barnes  
  
R. P. Malis  
A. F. Collins  
  
J. W. Kerr, Ph.D.  
H. G. Stephenson  
M. H. Drinkwater  
J. Stein  
I.A.R. Halliday  
  
C. Dunkley  
D. B. Coutts  
E. Mitchell  
  
C. Mitchell  
J. McGregor  
M. S. Chlach  
R. J. Page  
G. McNabb  
  
N. V. Storey  
N. V. Storey  
M. D. McIvor  
W. Rutherford  
A. F. Pearce  
A. L. Harris

PRESENTED AT RED DEER

Organization

Red Deer Regional Planning Commission

County of Paintearth

City of Red Deer

Nick's Landscaping

Red Deer Fish and Game Association

Master Explorations Limited

Private

Alberta Wilderness Association

Private

Dickson Fish and Game Association

Abcon Engineering (Alberta) Limited

Alberta Fish and Game Association,  
Zone 3

Private

Private

Private

Lacombe Fish and Game Association

Canadian Wolf Defenders and Defenders  
and Wardens of Nature

Presented By

R. Cundy and  
W. G. Shaw

G. Tomilson

Mayor R. E. Barrett

J. Wotherspoon

R. H. Scammell

E. J. Panchysyn

H. Lembicz

W. J. Ditchburn

E. Kure

H. Jensen

W. J. Blackstock

H. Rhodes

R. F. McBride

D. Beechinor

N. Kyisle

J. Towle

R. Guest and  
D. Roles

SUPPLEMENTARY SUBMISSIONS PRESENTED

Private

Private

Private

Alberta Fish and Game Association.

Canford Engineering Limited

E. W. Stutchbury, Q.C.  
Barrhead, Alberta

D. A. Hackbarth, Ph.D.  
Edmonton, Alberta

C. R. Chandless  
Box 621  
Rocky Mountain House

E. E. Scoville  
Medicine Hat, Alberta

N. J. Duncan, P. Eng.  
Edmonton, Alberta

Organization

Private

Alberta Fish and Game Association, Affiliate  
Clubs, Zone 2

Private

Private

Private

Private

Federation of Western Outdoor Clubs  
Central Alberta Big Game Trophy Club

Private

Private

Private

Private

Private

Rocky Mountain House Chamber of Commerce  
Sundre and District Chamber of Commerce  
Federation of Alberta Naturalists

Presented By

C. L. Sibbald, P. Eng.  
Calgary, Alberta

T. McKay

P. E. Fuller  
Calgary, Alberta

F. Walcott  
San Francisco, Calif.

R. E. Kelly  
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A. Harmon  
Banff, Alberta

B. Evans

J. O. Paton

T. Beck  
Calgary, Alberta

J. Burness  
Lethbridge, Alberta

R. H. Carlyle  
Blackfalds, Alberta

R. F. Mountain  
Innisfail, Alberta

R. C. Marfleet  
Sundre, Alberta.

T. Hoffman

O. A. Procyshen

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Spruce Grove, Alberta

APPENDIX 5

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**RESOURCE CENTRE  
INST. FOR ENVIRON'L. STUDIES  
UNIVERSITY OF TORONTO**



